PROLIFERATION OF WEAPONS OF MASS DESTRUCTION IN THE MIDDLE EAST AND TURKEY'S SECURITY CONCERNS

The Institute of Economics and Social Sciences

of

Bilkent University

by

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In Partial Fulfillment of the Requirements for the Degree

of

MASTER OF INTERNATIONAL RELATIONS

in

THE DEPARTMENT OF

INTERNATIONAL RELATIONS

BİLKENT UNIVERSITY

ANKARA

September 2001

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ABSTRACT

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Master's Thesis, Department of International Relations

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September 2001

Proliferation of weapons of mass destruction has always constituted a threat to international peace. International public concern about proliferation of unconventional weapons has rapidly increased since the end of the Cold War. This thesis analyzes the weapons of mass destruction threat against Turkey and its dimensions. It starts with the definition of the concept of threat and the characteristics of weapons of mass destruction. In assessing the threat, deterrence theory is applied. As the theory entails, capabilities and the intentions of possible adversaries are studied. Chemical, biological, radiological, nuclear and ballistic missile capabilities of Iran, Iraq, Syria, Egypt, Saudi Arabia and Israel are examined in detail to figure out whether Turkey confronts weapons of mass destruction threat exposure from its neighbors. Alongside the present procurement efforts of the states as the focal point of the study, past attempts to proliferate and the illegal transfers of weapons technology, equipment and leakage of fissile material are presented so as to shed light on the dimensions of the mass destruction threat.

Key Words: Weapons of Mass Destruction, Deterrence, Threat

ÖZET

ORTADOĞU'DA KİTLE İMHA SİLAHLARININ YAYILMASI VE TÜRKİYE'NİN GÜVENLİK ENDİŞELERİ

Çağlar, Barış

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Eylül 2001

Kitle imha silahlarının çoğalması her zaman için uluslararası güvenliğe bir tehdit oluşturmuştur. Soğuk savaşın bitimiyle konvansiyonel olmayan silahlara duyulan uluslararası ilgi hızla artmıştır. Tehdit kavramı ve kitle imha silahlarının özellikleri ile başlayan bu tez, Türkiye'ye yönelik kitle imha silahları tehdidini ve boyutlarını çözümlemeye çalışmaktadır. Tehdit değerlendirmesi caydırıcılık teorisi temelinde yapılmıştır. Türkiye'nin komşularından gelen bir kitle imha silahı tehdidiyle karşı karşıya olup olmadığını belirleyebilmek için, İran, Irak, Suriye, Mısır, Suudi Arabistan ve İsrail'in kimyasal, biyolojik, radyolojik, nükleer ve balistik füze kapasiteleri detaylı bir biçimde incelenmiştir. Tezin özünü oluşturan halihazırdaki silah edinme çabalarının incelenmesinin yanısıra, bu devletlerin geçmişteki silahlanma çabaları, silah teknolojileri ve ekipmanlarının transferleri ve nükleer madde sızıntısı da sergilenmeye çalışılmıştır.

Anahtar Kelimeler: Kitle İmha Silahları, Caydırma, Tehdit

ACKNOWLEDGEMENTS

This thesis owes greatest debt to Asst. Prof. Mustafa Kibaroğlu for his invaluable guidance, encouragement and understanding. Without his guidance and comments, the thesis could not be finalised. In particular, his outstanding encouragement was my source of motivation.

I am grateful to Asst. Prof. Gülgün Tuna and Asst. Prof. Süheyla Özyıldırım for taking part in my defense examination. Their valuable comments enriched my study. I am also most indebted to Prof. Tuna for her advices throughout the writing process.

I would like to express my deep gratitude to my mother, Nurten Çağlar for her endless moral support to me in writing this thesis, and for her support throughout my whole education life. I owe much to her.

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ABBREVIATIONS

AHF……..Anhydrous Hydrogen Fluoride

BTWC……...Biological and Toxin Weapons Convention (1972)

CBRN……..Chemical, Biological, Radiological, Nuclear

CBW……...Chemical and Biological Weapons

CSIS……...Center for Strategic and International Studies

CTBT…….Comprehensive Test Ban Treaty

CW……..…Chemical Weapons

CWC……Chemical Weapons Convention

DCI……..…Directorate of Central Intelligence

DU……Depleted Uranium

FAS……..……Federation of American Scientists

GDP……Gross Domestic Product

GPS……..…Global Positioning System

HEU……..Highly Enriched Uranium

IAEA……...International Atomic Energy Agency

ICBM…….Intercontinental Ballistic Missile

INS…….…….Inertial Navigation System

MRBM……...…Medium-Range Ballistic Missile

MTCR……..Missile Technology Control Regime

NATO……North Atlantic Treaty Organization

NBC……...…Nuclear, Biological, Chemical

NLD……..……Nunn-Lugar-Domenici

NMD……..……National Missile Defense

NPT……....Nuclear Nonproliferation Treaty

NTI……...Nuclear Threat Reduction

NWS…….Nuclear Weapon States

RPV…….Remotely Piloted Vehicles

RW…….……Radiological Weapons

SIPRI……Stockholm International Peace research Institute

SHIG……..... Shahid Hemmat Industrial Group

SLV……..……..Space Launch Vehicle

SRBM……..Short-range Ballistic Missile

TEL……...Transport-Erector-Launcher

TNT…….. Trinitrotoluene

WHO…….World Health Organization

WMD…….Weapons of Mass Destruction

UAV…….……Unmanned Aerial Vehicle

UN…….……United Nations

UNMOVIC….. the United Nations Monitoring, Verification and Inspection Commission

UNSCOM……. the United Nations Special Commission

UNSCR…….…the United Nations Security Council Resolution

INTRODUCTION

Even in the depths of the Cold War, the United States and the Soviet Union had one interest in common: nonproliferation of chemical, biological, radiological and nuclear weapons (CBRN), and of their basic delivery means, namely ballistic missiles. During the Cold War, states tested their ability to acquire them. International public concern about proliferation of unconventional weapons has rapidly increased since the end of the Cold War. The former Soviet Union territory is now a troubling potential source for leakage of CBRN capabilities, and a new black market may further enable states to acquire unconventional weapons. The Soviet Collapse left unsecured bomb-grade materials in the Russian Federation, Kazakhstan, and Ukraine and Belarus on whose territory nuclear weapons were deployed. The fear that smugglers might turn these countries into a global black market is high on the agenda. Documented cases of nuclear leakage give substance to this fear. Along with nuclear proliferation, the proliferation of ballistic missiles, biological and chemical weapons is a major threat to international order. Incentives of a number of states to pursue CBRN capabilities are a combination of political, military and economic objectives, and nuclear 'proliferation' is not a 'disease' as put forward by the "rogue states" rhetoric. Nuclear proliferation is much more a symptom of the struggle for power that characterizes international relations with or without superpower conflict. Regional or international rivalries enforce states to attempt to protect their core national interests. The fundamental military utility of CBRN capabilities are two fold: First, deterrence through the threat of use of them (CBRN weapons and ballistic missiles increase the risk that a country will be deterred from threatening or beginning armed hostilities against an adversary), and, secondly, the

potential to radically change the conduct of war through actual use. Indian and Pakistani nuclear explosive tests in May 1998 and self-proclamations that they had become nuclear weapon powers can give justification to other proliferants such as Iraq and Iran. Many of the countries that are of proliferation concern are adjacent or in a close proximity to Turkey. This thesis aims to assess the dimensions of WMD threat posed on Turkey. It examines six countries: Iraq, Iran, Syria, Egypt, Saudi Arabia and Israel. These states are important for Turkey owing to their geographical proximity, capability and rhetoric. As for Turkey, generals of the Turkish Air Forces and diplomats from the Turkish Foreign Ministry point out that Turkey does not have any state intention to pursue CBRN capabilities because they count on Turkish military's significant conventional power both in terms of man-power and technological sophistication. Turkey is also a faithful party to several international treaties. Turkey is a state party to the Nuclear Nonproliferation Treaty (NPT). It ratified it on 4/17/80. It signed the Comprehensive Test Ban Treaty (CTBT) on 9/24/96, and ratified it on 16th February 2000. It ratified the Chemical Weapons Convention (CWC) on 5/12/97. Turkey ratified the Biological and Toxin Weapon Convention (BTWC) on 11/5/74. It does not have any of the CBRN capabilities, and any intention to acquire either.

The thesis presents data available from public sources. Precise assessment of a state's capabilities is difficult because weapons of mass destruction programs remain secret and cannot be verified independently. The thesis comprises three chapters. The first chapter starts with the definitions of weapons of mass destruction. It explains their characteristics, effects, lethality, differences from each other, and countermeasures if possible. Appendixes are provided for further information on the details of WMD.

Second chapter is a presentation of the capabilities of neighboring states to Turkey. It examines, in detail, the nuclear, chemical biological and missile procurement efforts of Iraq, Iran, Syria, Egypt, Saudi Arabia, and Israel. It focuses particularly on present procurement endeavors, weapons transfers to figure out the dimension of the WMD threat exposure. It also tries to analyze their past efforts to give a picture of the foundation laid for developing such weapons. Third chapter reviews the current state of relations between Turkey and its neighbors together with their statements regarding WMD. While second chapter portrays 'capabilities', third chapter tries to present the intentions of the states concerned.

CHAPTER I

DEFINITION OF THE CONCEPT OF THREAT AND THE CHARACTERISTICS OF WEAPONS OF MASS DESTRUCTION

The dictionary meaning of threat is an expression of an intention to hurt, punish, and cause pain especially when one's instructions are not obeyed.[1]

As for world politics, perceived threats to core values of a given society can be deduced from distinct signs of hostile intent on the part of potential adversaries, from their capabilities or from some state of the international environment suggesting that future developments may endanger those core values.[2]

The concept of national threat perception denotes the perception of fundamental challenges to a given national society, to its survival as an independent political entity. Threat, then, denotes perceived challenges to core values and organizing principles that determine the role and functions of established institutions, of ruling elites and their power position. It may also include, in a further conceptualization, challenges related to political, economic and other interests that do not necessarily affect the essential feature of a given political system.

Manipulation of the opponent's threat perceptions is parcel of contemporary

[1] Paul Procter, Longman Dictionary of Contemporary English, Great Britain: Longman Group Ltd., 1978
[2] Sverre Lodgaard and Karl Birnbaum, Overcoming Threats to Europe: A New Deal for Confidence and Security, pp.39-46.

international relations and of the deterrence theory. Official threat assessments are one of the methods among many used to conduct manipulation. Official threat assessments of any state can be related to different types of challenges to which the security of any state is exposed. Three challenges can be specified: First, capabilities of potential opponents, their size, structure and the state of military readiness. Second, political designs of potential opponents or enemies. Third, instabilities and uncertainties of the international fora, and related difficulties in foreseeing and managing emerging crises. These challenges constitute the main elements of national threat assessments. All of them have been present in the calculations of governments, but their degree of relevance may differ from country to country and over time.[3]

The first element, namely capabilities, speaks for itself. The second one, that is political designs of potential opponents need to be clarified. Deterrence theory is made up of three main pillars: the capability of any given state, the political will of that state, and good communication of the message from one to another state. Policy-makers are concerned with the political designs of potential opponents. They do need to understand their intentions or will. They can only realize that through observing their behaviors and declared intentions. However, it is not rare cases where declarations, official threat assessments do not match the correlating behavior.

As for the third element, uncertainties rose to a high level when compared to the bipolar world of the Cold War. The superpowers as the cores could use a sort of checks and balances system in their dealings with their respective subordinates or peripheries. The demise of the Soviet sphere of influence in Eastern Europe in 1989 marking the end of the Cold War resulted in an uncertainty in the Middle East.

[3] Ibid.

Turning again to the second element, namely official threat assessments, statements play an important role in not only understanding opponents' intentions, but in manipulating opponents' threat perceptions as well. Barry Buzan differentiates structural threats from intentional threats.[4] Intentional ones are those implemented through manipulation and deterrence, and may be military or political threats as instruments of safeguarding vital national security interests. Structural threats are caused by means of conflicting organizing principles of national societies in a context where one another cannot simply ignore each other, especially, because of geographical proximity.

In both types of threats, namely intentional and structural threats, deterrence and reassurance are used hand in hand. Regarding intentional threats, the scope for mutual reassurance is likely to be greater, because perceived challenges result from consciously adopted political and military postures, rather than from the inherent characteristics of national societies or of diametrically opposed socio-political systems as in the case of structural threat formation. As for the Middle East region, Turkish diplomats and high military officials say they do not fear premeditated attack.[5] They do not think the other side wants war, nor do they believe there is any immediate danger of war. However, this is due to the strength of their own military defenses, not necessarily because of the peaceful intent of the sides. Thus, Turkey would not like to depend on the good will of

[4]Barry Buzan, People, States and Fears, the National Security Problem in International Relations, Hemel Hempstead : Harvester Wheatsheaf, 1991,pp.78-83; For instance, Iran and Turkey constitute such threats against each other mutually. The two societies have different inherent characteristics and diametrically opposed socio-political systems paving the way to formation of a structural threat for both. Robins maintains that Tehran is ideologically in conflict with the Kemalist philosophies of the Turkish regime. This ideological conflict is what Buzan calls 'a structural threat'. Philip Robins, Turkey and the Middle East, London: Pinter Publishers, 1991, p.58. Also please see Süha Bölükbaşı, "Turkey copes with revolutionary Iran", Journal of South Asian and Middle Eastern Studies, vol.13, no.1-2, Fall/Winter 1989, pp.92-97.

[5] Interviews with senior officers of Turkish Air Forces and diplomats from Turkish Ministry of Foreign Affairs who wished to remain anonymous.

other states: all Turkish officers stress the need for an effective military deterrence and defense.

Once the threat is conceptualized, we can figure out what poses a threat. Weapons of mass destruction (WMD) constitute the means with which potential adversaries can try to intimidate Turkey. Intentional threats occur through consciously adopted military postures. WMD is a keystone technology that affects military postures. Thus, WMD play a significant role in the military threat formations. The next step is to determine at what magnitude this threat in question may affect Turkey. Hence, dimension stands for the degree or magnitude of a threat posed, the range and number of the WMD capabilities perceived.

1.1 Conceptualization of Weapons of Mass Destruction

Weapons of mass destruction (WMD) and CBRN refer to a technology and weapons system. The shorthands WMD and CBRN are used interchangeably though there is a slight difference between the two which point to different categorizations of unconventional weapons. The term CBRN stands for chemical, biological, radiological, and nuclear weapons, whereas WMD denotes nuclear, chemical, and biological weapons and their most commonly used means of delivery, namely ballistic missiles. For reasons of clarity and precision, it is better to use the term CBRN in preference to the more commonly used, yet potentially misleading term WMD. It is misleading because WMD labels chemical, biological, and nuclear weapons under the same banner as if they were similar. With the exception of nuclear weapons, none of the unconventional weapons by itself is, in fact, capable of wreaking mass destruction, at least not in structural terms. For

instance, although weaponized biological agents are often described as "weapons of mass destruction", it does not follow that the ability to inflict mass casualties is an intrinsic property. There are key variables in determining the impact of a biological attack such as the quantity of agent employed, the means of dissemination, temperature and the speed and the direction of wind. Nevertheless, for practical purposes this study will use the term WMD.

The NLD (Nunn – Lugar – Domenici) Act of US[6] defines a "weapon of destruction" as "any weapon or device that is intended, or has the capability, to cause death or serious bodily injury to a significant number of people through the release, dissemination, or impact of a) toxic or poisonous chemicals or their precursors, b) a disease organism, c) radiation or radioactivity". Most of the definitions of WMD also include their most advanced delivery system, ballistic missiles. A ballistic missile is a fast flying rocket that temporarily leaves the earth's atmosphere while flying from the launch point to the missile's target. The reason why they are included in the WMD definition is that compared to every other system, especially aircraft, ballistic missiles are an extremely inefficient delivery system for conventional high-explosive warheads owing to the great expense incurred for each kilogram of payload delivered. For instance, Iraq

[6] Sam Nunn is co-chairman and chief executive officer of the Nuclear Threat Initiative (NTI), a foundation committed to reducing the global threat of nuclear and other weapons of mass destruction. Nunn served in the US Senate from 1972 to 1996. Prior to his service in the Senate, he served in the Georgia State House of Representatives. His legislative achievements include the landmark Department of Defense Reorganization Act, and the Cooperative Threat Reduction Program, also known as the Nunn-Lugar program, which provides incentives for the former Soviet republics to dismantle and safely handle their nuclear arsenals. Senators Nunn and Richard Lugar were nominated for the 2000 Nobel Peace Prize for their work in conceiving, legislating and sustaining this important program. In addition to his work with NTI, Senator Nunn has continued his service in the public policy arena as a distinguished professor in the Sam Nunn School of International Affairs at Georgia Tech, as chairman of the board of the Center for Strategic and International Studies in Washington, D.C. The purpose of NLD (Nunn – Lugar – Domenici) Act of US-Defense Against Weapons of Mass Destruction Act of 1996- is to address the US's critical lack of preparedness for what is arguably the most serious threat to its national security: the proliferation of

used conventionally armed Scud missiles during the 1991 Gulf War, but these attacks were largely ineffective in a strict military sense. It is thus appropriate to conceive the ballistic missile threat principally as a high-velocity almost indefensible WMD delivery system.

Unless they carry a nuclear, biological or chemical warhead, ballistic missiles are not weapons of mass destruction. They are just one of the delivery systems without which nuclear, biological, and chemical (NBC) warheads deployed on are not WMD. Still, it is a fallacy to equate the WMD threat with the threat of ballistic missile attack.[7] Because WMD can be delivered to a target by multiple means many of which are more accessible and less costly than ballistic missiles.

1.2 Characteristics of Nuclear Weapons

Nuclear weapons release vast amounts of energy by splitting the atoms of highly enriched uranium (HEU) or plutonium. A nuclear weapon can be described as a device in which most or all of the explosive energy is derived from fission, fusion or both. What is a nuclear fission? It is the splitting of the nucleus of an atom into two or more parts. HEU and plutonium when bombarded by neutrons, will release energy and emit additional neutrons while splitting into lighter atoms. Explosive energy is derived through this process, or through fusion where light isotopes of hydrogen usually deterium and tritium join at high temperatures and release energy and neutrons. The HEU bomb-the first atomic bomb- was first used against the Japanese city of Hiroshima in 1945 causing an explosion equivalent to more than 16,000 kilotons of TNT and killed over 100,000

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weapons of mass destruction; First Annual Report to the President and the Congress of the Advisory Panel to Assess Domestic Response Capabilities for Terrorism Involving WMD, Ebscohost-Online Database.

[7] Richard Falkenrath, " Weapons Of Mass Reaction-Rogue States and Weapons of Mass Destruction" in Harvard International Review, Summer 2000, pp.52-54

people. There are also more advanced weapons, thermonuclear weapons in which a primary fission nuclear explosion triggers a secondary fusion explosion. It can cause explosions approximately a hundred times larger than the Hiroshima bomb[8].

Thus, a nuclear weapon is a collective term used both for atomic weapons and hydrogen bombs. They are weapons based on a nuclear explosion, whether it is fission or a fusion weapon. Eight states are known to possess nuclear weapons capabilities: The U.K., China, Russian Federation, the U.S., France, India, Pakistan and Israel. Some are believed to be seeking to acquire nuclear capability: Iran, Iraq, Syria, Libya, and North Korea. Of those Israel, India and Pakistan are de facto nuclear powers. They are not party to the NPT (Nuclear Non-Proliferation Treaty), but still have nuclear weapons[9].

Today, the destructive power of nuclear weapons is very well understood. If a 1-megaton thermonuclear warhead exploded at optimum altitude over a large city, little would be left standing or alive within five miles[10]. Along with the blast and radiation, a firestorm could be ignited, burning everything while extending the range of destruction. The lethal radioactivity/fallout effect after the explosion could cover a very large region. The crucial point that gives nuclear weapons its superiority over CBW is that their kill expectancy can be accurately predicted or calculated, whereas no military official can be sure of the military effectiveness of CBW or their probability to succeed in achieving the

[8] Rodney W. Jones and Mark G. McDonough, Tracking Nuclear Proliferation-A Guide in Maps and Charts, 1998, Washington D.C.: The Brookings Institution Press, 1998.

[9] The Nuclear Non-proliferation Treaty that entered into force in 1970 divides the countries of the world into two categories, "nuclear-weapon states" and "non-nuclear weapon states." It defines "nuclear-weapon states" as countries that detonated a nuclear explosion before January 1, 1967, namely the United States (first detonation in 1945) the Soviet Union (1949), Great Britain (1952), France (1960), and China (1964). Russia succeeded to the Soviet Union's status as a nuclear-weapon state under the treaty in 1992. Although India, Pakistan and Israel are among the principal states of proliferation concern and each has nuclear installations, they are not party to the NPT.

[10] Wolfgang K.H. Panofsky, "Dismantling the Concept of 'Weapons of Mass Destruction'," in Arms Control Today, April 1998, p.1.

desired end[11]. Successful defenses against nuclear weapons are extremely difficult, if not impossible, for two basic reasons: First, they have incredible destructiveness just of a single nuclear explosion, and secondly there are numerous ways to deliver them making it very hard to defend against. During World War II, British air defenses succeeded in shooting down approximately 1 in 10 attacking aircraft carrying conventional bombs. This reduced the damage after flying 10 sorties, and London stood, though it was badly battered[12]. Air defenses did a job although minimal. It is not the case for the aircrafts carrying unconventional bombs since just one successful delivery is enough for annihilation. Thus, a standard, which a defense against nuclear weapons has to meet, must be greatly higher than that required for conventional military exchanges, and in a situation where just one of them is fatal; such a standard is very hard to meet. Moreover, if the offensive weapons-defensive weapons debate is taken into consideration, it is clear that there is an action-reaction dynamics between defense and offense. In a war environment where delivery means are multiple for an attacker, it is always easier for the attacker to bypass the defenses by changing the means of delivery or deploying counter measures or maneuvering vehicles or deploying multiple vehicles. When it is possible to shift among the delivery options, defense options will always be expensive than the cost of the offense still leaving the defender vulnerable. Technology is the impetus for arms races and weapon systems and capabilities, thereby also shaping the pace of arms control. Up to our day, technological advances benefited the offense side of the war equation, and

[11] James J. Wirtz, "Counter proliferation, Conventional Counterforce and Nuclear War", in Eric Herring (ed.) Preventing the use of Weapons of Mass Destruction, Great Britain: Anthony Rowe Ltd., 2000, pp.6-13.
[12] Panofsky, op. cit. p.4

while this is the case nuclear weapons continue to be the most desired weapon[13].

Nuclear weapons can be deployed in the form of land or sea-based ballistic and cruise missiles of various ranges, artillery shells and aircraft. Nuclear explosives have been weaponized into atomic demolition munitions, anti-submarine weapons, earth penetrators, and air and missile defenses[14]. Furthermore, short-range missiles fired from nearby ships, giving such missiles a strategic value, can also deliver nuclear weapons. They can be detonated on board ships in a harbor, or they can simply be smuggled across national borders. Apart from the above-mentioned difficulties active defense confronts, passive defense is no good at all either. Because a nuclear explosion brings two kinds of effects (prompt and delayed effects) with it, the end result is unacceptable: A simple nuclear explosion has intense prompt effects such as blast, radiation and heat and delayed effects such as radioactive fallouts and sudden firestorms. As a consequence of all, meaningful defense against nuclear weapons either by active or passive means, is extremely difficult.

1.3 Characteristics of Biological Weapons

The killing mechanism of a biological weapon is disease. Human beings have yet to experience full power of these detestable weapons, for there have been only a few instances of biological weapons attacks, with the most rudimentary types of it. For the target to be attacked, it must be infected through successful dissemination of a weaponized biological agent. As to the route of primary attack by BW, it is mainly of six:

[13] For the linchpin of the issue and one of the cornerstone sources please see, Thomas C. Schelling and Morton H. Halperin, Strategy and Arms Control, New York: Pergamon Press Inc. 1985; Stuart Croft, Strategies of Arms Control, Manchester: Manchester University Press, 1996, pp. 138-146

Inhalation, ingestion of contaminated food and water, contamination of an open wound with bacterial warfare agent, insect vectors and ballistic and cruise missiles, and spraying them by means of aircraft[15].

There are several differences of biological weapons from nuclear weapons such as the dispersing method's complexity, meteorological conditions, survival of the agents and their delayed affects. Biological agents cannot be dispersed by a single-point explosion, but must be spread by distinct mechanisms like spray tanks or by dispersing separate mini-munitions over a wide area. In doing the latter, a missile's payload is fractionated and cluster munitions are prepared for biological weapons. This is not an easy task, and only advanced states have it by far[16].

Meteorological conditions affect the delivery environment very much. For instance, windy weather or a shade, or whether a day time or night make considerable differences on their impact depending upon the agents' characteristics. Meteorological conditions also affect the survival of the agents; temperature in particular is critically crucial of their survival duration. Their survival is generally of short duration and their effects may be delayed for days to weeks. The lethality of biological weapons is controversial and much has been written on it[17], but test data are limited. In assessing

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[14] Dennis M. Gormley, "Hedging Against the Cruise-Missile Threat", in Survival Vol.40, No.1, Spring 1998, pp. 97-103.

[15] Brad Roberts, "The Proliferation of Biological Weapons: Trends and Consequences"; in Oliver Thranert (ed.), Enhancing the Biological Weapons Convention, Bonn: Dietz, 1996, pp.57-66; Douglas Holdstock, "Biotechnology and Biological Warfare", Peace Review, 12:4 2000, pp.549-553; Peter Hadfield, "Lethal Legacy" in New Scientist, Vol. 169, Issue 2276, 02/03/2001, p.5

[16] Graham S. Pearson, "Biological Weapons: Their Nature and Arms Control", in Efraim Karsh and Martin S. Navias (eds.) Non-Conventional-Weapons Proliferation in the Middle East-Tackling the Spread of Nuclear, Chemical and Biological Capabilities New York: Oxford Uni. Press, 1993, pp.111-114; Panofsky, op. cit. pp.3-9.

[17] Graham S. Pearson, "Biological Weapons: Their Nature and Arms Central", in Efraim Karsh and Martin S. Navias (eds.) Non-Conventional-Weapons Proliferation in the Middle East-Tackling the Spread of Nuclear, Chemical and Biological Capabilities New York: Oxford Uni. Press, 1993, pp. 99-133; Edward M. Spiers, Chemical and Biological Weapons: A Study of Proliferation, Great Britain The Macmillan Press

weapons lethality, the ratio of potential lethality to the total weight of the material is a criterion that can be used to make comparisons. According to that criterion, and given that a weaponized virulent biological agent is widely distributed over an exposed population under best circumstances (such as shade, warm weather, and a suitable speed and direction of wind) biological weapons' ratio of lethality could be comparable to that of nuclear weapons.

As a hedge against biological agents, one passive measure that can be taken is mass preventive vaccinations. It can be effective but only if the type of biological agent is known. From 1998 onwards US troops in the Persian Gulf use these vaccines as preventive measures[18]. Anthrax, against which they are protected, is known to be widely produced in Iraq and Iran[19]. Nevertheless, it can be a futile attempt when an attacker has an alternative agent available in its stockpile. The other side of the defensive battle, active defenses option, does not offer an optimistic picture against BW or CW. Active defenses against them are problematic for various delivery options available to the enemy whether it be a state-sponsored proxy group or a state.

1.4 Characteristics of Chemical Weapons

Ltd., 1994, pp. 130-153; Wolfgang K.H. Panofsky, op cit. p. 1-4; Seth Carus, "Biological Warfare Threats in Perspective" in The Brooking Institution Web page, http://www.brook.edu/fp/events/19980427 _carus.htm; Brookings Ins. Proliferation Brief, Vol.2, No.11, July 1 1999 "Understanding the BW Threat"; Jonathan B. Tucker and Amy Sands, "An Unlikely Threat", in Bulletin of the Atomic Scientists, July, August, 1999, pp.2-8; Ronald M. Atlas, "Medical Biological Nature of the Threat of Biological Weapons to US Security" in Brookings Ins. Foreign Policy Events Web Page; Gert G. Harigel, "Chemical and Biological Weapons: Use in Warfare, Impact on Society and Environment", Carnegie Endowment for International Peace Web Site, 3/25/01 http://www.ceip.org / files /publications ;Federation of American Scientists, Chemical /Biological/ Radiological Incident Handbook, October1998, http://www.fas.org /irp/threat/cbw/CBR.htm

[18] Brad Roberts, "The Proliferation of Biological Weapons: Trends and Consequences; in Oliver Thranert (ed.), Enhancing the Biological Weapons Convention, Bonn: Dietz, 1996, pp.57-66.

[19] Anthony H. Cordesman, Weapons of Mass Destruction in Iraq, Center for Strategic and International Studies, Washington DC, February 2001, Online Source, csis.org, "Strategic Assessment", p.16; Vice Admiral Thomas K. Wilson, Military Threats and Security Challenges Through 2015, Defense Intelligence Agency, Senate Select Committee on Intelligence, US, 2 February 2000, pp. 21-23.

Chemical weapons are devices that disseminate poisons and other toxic substances usually in the form of gases, liquids or sprays. They are relatively easy to manufacture, deploy and store when compared to biological and nuclear weapons[20]. Stockpiling of biological weapons entails much care, and that of nuclear weapons is much more expensive and entails a big infrastructure and space when compared to chemical weapons. CW are easy to manufacture because many of the materials used in their fabrication have civil and commercial uses[21].

Unlike the case for defense against nuclear weapons, protection with various degrees of efficiency is possible against chemical and biological weapons (CBW). However, inconvenient it may be for military forces on the battlefield for maneuvering and attacking, still there are passive defenses such as gas masks, protective clothing and vaccination. Technical means, protective gear-gas masks and special clothing, work for the defense against CW[22]. Since only nuclear weapons are completely indiscriminate by their explosive power, heat, blast, radiation, and radioactivity having a global repercussion, chemical arms or more preferably fitting jargon weaponized chemical agents are usable in a particular region, rather than, causing global security problems. These arguments are evidenced by a United Nations study[23], which examines the compared hypothetical results of an attack, carried out by one strategic bomber using any of the three weapons.

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[20] "Devils's Brew's in Detail"; http://www.sipri.org, CBW project Website ; Chemical Handbook-October 1998, http://www.fas.org/irp/threat/cbw/CBR_hdbk.htm

[21] Gert Harigel, "Chemical and Biological Weapons: Use in Warfare, Impact on Society and Environment"; http://www.ceip.org/files/Publications/Harigelreport

[22] Such protective gear can be made available although it reduces the performance of troops in combat. To a more limited extent, civilian populations may benefit from those means as demonstrated in the case of Israel during the Gulf War.

The results are as follows: A one-megaton nuclear bomb can kill 90 percent of unprotected people over an area of 300 square kilometers. A chemical weapon of 15 tons might kill 50 percent of the people in a 60 square kilometers area, but a 10-ton biological agent efficiently weaponized could kill 25 percent of the people, and make 50 percent ill, over an area of 100,000 square kilometers. These numbers are assumed under the circumstances that the chemical and biological agents can be dispersed over a large surface and reach the ground level, whereas nuclear weapons can be exploded at any altitude and on ground level with the desired military efficiency. Even extended use of chemical weapons had no decisive impact on outcome of wars, had only local success, and it only made wars uncomfortable to no purpose[24]. It entailed to wear protective gear, and for the user made it hard to occupy or transport troops from the area in which it is used. In spite of all the limitations of their use, chemical weapons are still around and being produced in the very first place, and they are still kept in the military arsenals as weapons of response in kind or flexible response[25]. They had been produced in enormous quantities, and their elimination entails huge costs.

1.5 Missions Assigned to Weapons Destruction

In accordance with their different features, the potential military roles or missions assigned to the three types of unconventional weapons-chemical, biological and nuclear

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[23] Gert Harigel, "Chemical and Biological Weapons: Use in Warfare, Impact on Society and Environment"; http://www.ceip.org/files/Publications/Harigelreport; and Chemical, Biological, Radiological and Nuclear (CBRN) Terrorism, http://www.fas.org/irp/threat.

[24] Center for Nonproliferation Studies (http://cns.miis.edu); CB Warfare and Defenses, Chemical & Biological Weapons Resource Page, http://www.opcw.nl/chemhaz/protect.htm, "Protection against Chemical Weapons".

[25] Anthony H. Cordesman, WMD in Iraq, Center of Strategic and International Studies (Online Database), www.csis.org February 2001, p.19; Kenneth M. Pollack, "Current Iraqi Military Capabilities: An

weapons-are very different. The nuclear weapons policies of superpowers[26] are in a continuous evolution, but in the post-Cold War era, it is in the opposite direction compared to that of the Cold War. Russia facing conventional upper hand of the Western forces adopted a policy similar to the former NATO doctrine for compensating its perceived conventional inferiority by means of counting on the unconventional complex war tools, nuclear weapons[27]. Hence, the mission of nuclear weapons is the maintenance of deterrence, while CBW are seen basically as terrorist weapons that can be used for unconventional warfare or terrorism.

1.6 Radiological Weapons

Radiological weapons (RW) are basically a nuclear-weapon variant designed to kill through radiation only, as opposed to blast or shock. The radioactive materials for radiological weapons could be fission products, plutonium and other actinides from civilian nuclear reactors, or artificially produced radioactive nuclides UN inspectors uncovered evidence that Iraq was working on RW prior to the Gulf War[28]. Furthermore, radiological impact of the use of depleted uranium ammunition concerns have been expressed about the possible health and environmental consequences of exposure to depleted uranium (DU) arising from the use of this material ten years ago in the Gulf, and subsequently in the Balkans. This exposure could have been caused by external radiation

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Assessment", by the courtesy of Washington Institute in Middle East Review of International Affairs, Issue 4/ February 1998, p.3

[26] 'Superpower' is used in strict military sense in that nuclear capable states which have second-strike capabilities: The United States, and the Russian Federation.

[27] Russian/Soviet Doctrine, www.fas.org/nuke/guide/russia/doctrine/intro.htm; "Russian National Security Blueprint", Rossiiskaya Gazeta, 26 December, 1997, pp. 4-5; The Foreign Policy Concept of the Russian Federation, www.fas.org/nuke/guide/russia/doctrine/econcept.htm; Mustafa Kibaroğlu, "Russia's New Concept of National Security and the Military Doctrine" in Avrasya Dosyası-Rusya Özel Sayısı, February 2001, pp.16-18

arising from DU or by the inhalation, ingestion or intake through wounds of DU spread in the environment. It has also been suggested that adverse health effects, notably leukaemia and other forms of cancer, could be attributable to such exposure.

Uranium is a naturally occurring radioactive material; its three principal radioactive isotopes are U-238, U-235 and U-234. One of the by-products of the process of uranium enrichment is DU that is comprised almost entirely from U-238 isotopes. It is about 60% as radioactive as natural uranium. Physically and chemically, DU behaves in the same way as natural uranium. Stockholm International Peace Research Institute (SIPRI) has outlined several scenarios for radiological warfare[29]. For offensive purposes, they could be used to force mass evacuations, create economic chaos, or occupy territory, avoiding the infrastructure damage involved in a nuclear explosion. On the defensive side, RW can be used to deny an enemy territory trough contamination, making it impassable.

The effects of radiological weapons are essentially similar to the effects of nuclear weapons, and long-term radiation effects of RW may become burdensome to states attacked on medical facilities and pose social and economic long-term recovery difficulties. They can be delivered by missiles either ballistic or cruise, or by an aircraft-delivered bomb. RW may consist of bombs or shells packed with radioactive materials and can be delivered by means of ordinary (conventional or non-nuclear) explosives. Besides, radioactive materials can also be delivered in the form of liquid or solid aerosols

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[28]"Devil's Brew's in Detail", Devil's Brews http://www.cdiss.org/rw.htm; United Nations," UN. Says Iraq worked on radiological weapon", 1995 Reuters Information Service, Nov 7, 1995. Also available web-based version in www.nando.net/ntn/world.htm

[29] "Devils's Brew's in Detail"; http://www.sipri.org,CBW project Website ; Chemical Handbook-October 1998, http://www.fas.org/irp/threat/cbw/CBR_hdbk.htm;"Radiological Weapons" Iraq Special Weapons, http://www.fas.org/nuke/guide/iraq/other/radiological.htm

by aerial spraying through use of an aircraft or by means of an UAV (Unmanned Aerial Vehicle). Three potential targets for RW include population centers, the water supplies of an adversary and nuclear reactors. In population centers, they may cause mass casualties over short and long-term and force large-scale evacuation. Radioactive substances could contaminate the water supplies of an adversary, and lastly, if nuclear reactors are attacked, a costly and dangerous radiological incident may occur. However, it has its own limitations for the country using them and its neighbors. It poses long-term contamination hazards, in addition to provoking possible nuclear retaliation against the user, in the light of the given security doctrines of NWS (Nuclear weapon states)[30].

In the Middle East, the immediate sphere of concern for Turkey comprises of states adjacent to it: Iran, Iraq and Syria. The common characteristics these states share, Philip Robins argues, entail serious caution from Turkey's point of view.[31] All these states have regional leadership aspirations and they have resources to give substance to these aspirations. They all have common borders with Turkey, while all share a deep fundamental suspicion of Turkey. And, finally all three are formally anti-Western. Hence, it is prudent for Turkey to keep a close eye on them. To start with Iraq, it is essential to examine the Iraqi actions from 1980s onwards so as to figure out the characteristics of the current regime under Saddam Hussein's control. Therefore, Iran-Iraq War and crisis over Kuwait is examined with regard to the Iraqi regime's nature. Furthermore, because the threat Iraq poses depends upon its ability to overcome the economic and military

[30] China's Position on Nuclear Disarmament, www.fmprc.gov.cn/eng/4492.html, 30/04/2001; Basic Nuclear Features, Questions of Command and Control; NATO Nuclear Sharing and the Non-Proliferation Treaty Chapter III: NATO Doctrine Since the End of the Cold War, http://www.basicint.org/nuk-nukesharing-part4.htm; R. Jeffrey Smith, "Clinton Directive Changes Strategy On Nuclear Arms; Centering on Deference, officials Drop Terms for Long Atomic War", Sunday, December 7, 1997; Page A01, Washington Post.

[31] Philip Robins, Turkey and the Middle East, London: Pinter Publishers, 1991, p.48

sanctions imposed on it, a brief examination of the current sanctions situation also takes place.

CHAPTER II

WEAPONS OF MASS DESTRUCTION CAPABILITIES OF NEIGHBORING STATES TO TURKEY

2.1 Past and Recent Developments Regarding Iraq

Among the three adjacent states to Turkey, namely Iran, Iraq and Syria, Iraq seems to be the most aggressive and militarist state. It invaded Iran and Kuwait and used chemical weapons against its own civilians. [32]Iraq used chemical weapons extensively and continuously against Iran from 1982 to 1986 during the Iran-Iraq War. [33]Prior to the invasion of Iran by Iraq, Saddam Hussein may have felt threatened by Khomeini and the Iranian Revolution. [34] It might also have attempted to exploit Iran's apparent military weakness owing to a series of upheavals during the Iranian revolution. The US embassy hostage crisis[35] cut Iran off from Western arms and military support furthering the military weakness of Iran. Iraq invaded Iran on September 22, 1980, most probably evaluating all these developments above as a window of opportunity for asserting itself in

[32] Iraq did not hesitate to use poison gas against its own civilians while fighting the battle of Halabjah during the Iran-Iraq War.

[33] Javed Ali, "Chemical Weapons and the Iran-Iraq War. A Case Study in Noncompliance", The Nonproliferation Review, Vol.8, No.1, Spring 2001, pp.22-26.

[34] Although many political forces, including liberal, nationalist and Marxist, did play a powerful part in the overthrow of Shah Reza Pahlavi in February 1979, it was dominated by a militant Islamic ideology which quickly won the intra-revolutionary battles and consolidated its control over the state. Iran gave the world its first radical Islamic republic and provided a new inspiration to political Islam everywhere. The Iranian revolution was the first mass movement in history to establish an Islamic theocratic state. Iran's fervor to export the revolution frightened the existing political order whether secular or conservative Islamic in West Asia and the Middle East constituting "a structural threat" to regional states. Furthermore, the new revolutionary state in Iran was seen as reflecting not just Islamic militancy but also the Persian ambitions for a larger influence in the Middle East. When Khomeini became the leader of the revolution, he immediately called for the overthrow of the secular regime in Iraq. He also sent religious messengers to the Shi'ites of Iraq.

[35] The US embassy hostage crisis refer to the events following the seizure of the American Embassy in Tehran by Iranian students on November 4,1979. The overthrow of the Shah of Iran by an Islamic revolutionary government led to a steady deterioration in Iran-US relations.

the Middle East. [36]Iraq won the Iran-Iraq War to the point he forced Iran to accept a cease-fire. Iraq had no remarkable gains, but bankrupted, and had $80 billion worth of debt to his neighbors, Kuwait and Saudi Arabia, and to France and Russia. However, Iraq emerged from the Iran-Iraq War with a large and well-equipped military, one which was the most effective and experienced force in the Gulf region. After the war Iraq demanded its debts to be forgiven under the Arab cause. However, Kuwait and Saudi Arabia refused to forgive its debts. This prevented Iraq from enhancing its oil revenues. It appears that Iraq interpreted the growing ties between the United States and the Southern Gulf States as an effort to encircle itself. It might have seen the decline of Soviet power as a further threat to its interests.[37] Iraqis might have thought that the US was deliberately prolonging the Iran-Iraq War to weaken both countries. The Iran-Contra deal[38] probably reinforced Iraq's distrust of the United States. Russia tilted towards Iran during late 1980s, and this scarcely caused a good Iraqi-Russian cooperation[39]. Seemingly, these conspiracy theories in the back of the mind of the Iraqi leader, Saddam Hussein, as well as his ambition to assert Iraq as a major Gulf and Arab power led to the invasion of Kuwait by Iraq in August 1990.[40] The invasion of Kuwait, together with the invasion of Iran demonstrated that Iraq is an aggressive, opportunistic and militarist state using any means possible including the use of chemical weapons in realizing its goals.

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[36] Jon B. Alterman, "The Gulf States and the American Umbrella" Middle East Review of International Affairs, Vol.4, No.4, December 2000, pp.1-3.
[37] Anthony Cordesman, Iraq and the War of Sanctions; London: Praeger, 1999, p.16.
[38] The Iran-Contra Affair concerned two secret Reagan administration policies whose operations were coordinated by National Security Council Staff. The Iran operation involved efforts in 1985 and 1986 to obtain the release of Americans held hostage in the Middle East through the sale of US weapons to Iran, despite an embargo on such sales. The contra operations from 1984 to 1986 involved the secret governmental support of contra military and paramilitary activities in Nicaragua, despite congressional prohibition of this support.
[39] Anthony Cordesman, op. cit. p.17

Confronted with the threat of impeded flow of oil, which imperilled the national interests of some national Security Council member states such as the UK, US and France, a multinational coalition is forged, led by the United States but operating under UN mandate, to liberate Kuwait. The politics of oil entailed the prevention of Iraqi aggression from destabilizing other vital oil-producing countries of the Gulf. The Coalition forces under the UN mandate conducted Operation Desert Storm and Iraq was evicted from Kuwait. Security Council Resolution 687 passed in April 1991 was ostensibly intended to rid the world of Iraq's weapons of mass destructors. [41] UN Security Council Resolution (UNSCR) 687 set the terms for the cease-fire in the Gulf War. It calls for the dismantling of Iraq's WMD and long-range missiles and the means to produce them. It does not specifically mention cruise missiles, but the United Nations Special Commission (UNSCOM) interpreted it to ban long-range cruise missiles.[42] It also gives UNSCOM and the International Atomic Energy Agency (IAEA) the right to conduct challenge inspections and to supervise the destruction of Iraq's CBRN, ballistic and cruise missile capabilities. Since the end of the Gulf War, there is a struggle between Iraq and the UN in which Iraq tries to break out of the controls and sanctions the UN established as part of the cease-fire in the Gulf War. Baghdad adamantly resisted the terms of the cease-fire agreement, which required it to cooperate with the UNSCOM and the IAEA.

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[40] Efraim Karsh and Jnari Kautsi, "Why Saddam Hussein invaded Kuwait, Survival, vol. XXXIII, no.1, January/February 1991, pp. 18-25.

[41] Please see the views of a former inspector on the UN Resolutions and the American foreign policy regarding Iraq. Scott Ritter, "The Saddam Trap-Lessons in Failed Foreign Policies", Harvard International Review, Winter 2001, pp. 28-32.

[42] Dennis M. Gormley, "Hedging Against the Cruise-Missile Threat", Survival, vol.40, no.1, Spring 1998, pp.92-96.

The struggle between Iraq and UN-mainly the UK and the US-is a struggle to shape Iraq's conventional and unconventional military power. It is also a struggle to limit Iraq's capability to threaten its neighbours and to change the Iraqi regime through the removal of Saddam Hussein. This struggle continues for over ten years since the Iraqi invasion of Kuwait. Baghdad's persistent resistance towards the terms of the cease-fire agreement-its policy of denial and deception towards UNSCOM-culminated with the allied bombing of Iraq under Operation Desert Fox in December 1998.[43] Since late 1998, Baghdad has refused to allow UN weapons inspectors into Iraq as required by the cease-fire agreement and UN Security Council resolutions. [44] As a consequence of Iraqi refusal to accept inspectors, there have been no UN inspections for over two years as of 2001. Although Iraq was crumbling under economic sanctions, and Saddam Hussein's army was largely devastated during the operations Desert Storm and Desert Fox, he has grown more confident in his ability to hold on to his power since the end of the Gulf War.

Iraq may have begun to win its struggle against the UK and the United States, and in attempting to preserve its military capabilities and WMD. Saddam Hussein had some success in ending Iraq's international isolation. Since August 2000, nearly 40 aircraft have flown to Baghdad without obtaining UN approval widening the holes in the UN air embargo.[45] Several authors underscore that in Saddam Hussein's case, capabilities may

[43] Marc Weller, The US, Iraq and the Use of Force in a Unipolar World", Survival, 41-4, Winter 1999-2000, pp.81-90.
[44] UN Security Council Resolutions 687,707, 715 and 1284 set forth the conditions necessary for terminating the sanctions and the terms for the weapons inspections. UNSCR 1284, adapted in December 1999, established a follow-on regime to UNSCOM called the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC). Iraqi regime refused to accept any UN inspections for over two years. Because of the collapse of the inspection regime established by UNSCOM and the Iraqi rejection of UNSCR 1284, there is no vehicle for lifting the economic sanctions.
[45] Michael Eisenstadt, "The United States, Iraq, and Iran: Proliferating Risks, Dwindling Opportunities", Policy Watch – The Washington Institute for Near East Policy, May 15, 2001, p.1.

well mean intentions.[46] He has repeatedly demonstrated that he is willing to take extreme political and military risks ignoring the world opinion. He proved to be a crisis-escalator with little warning. Thus, his endeavors to overcome sanctions and to preserve his military capabilities take on special meaning for Turkey. In other words, the threat coming from Iraq originates in the Iraqi ability to preserve and, perhaps improve its military capabilities including WMD. In turn, its capabilities are consequent upon the outcome of efforts to punctuate the air embargo.

2.1 Past and Recent Developments Regarding Iraq

2.1.1 Why Does Weapons of Mass Destruction Capability of Iraq Constitute A Threat?

From Turkey's point of view, several reasons can be maintained in regarding Iraqi efforts to acquire WMD as militarily and politically threatening. First, the availability of WMD to a potential rival or adversary raises the cost of any future conflict increasing the amount of damage the adversary could inflict against military units or civilian population in cities. Second, WMD when used can readily alter the political environment in the Middle Eastern countries and in Turkey where political power is concentrated on a single city, the capital. Third, WMD and ballistic missiles increase the risk that Turkey will be deterred from threatening or beginning armed hostilities against an adversary.

[46] Ambassador Rolf Ekeus, former head of UNSCOM, "From UNSCOM to UNMOVIC: The future of Weapons Inspections in Iraq, "Policy Watch-The Washington Institute for Near East Policy , July 18, 2000, pp. 1-3; George Tenet, "Weapons of Mass Destruction: A New Dimension in US Middle East Policy", Middle East Review of International Affairs, Vol.4, No.2, June 2000, pp.2-8; Joseph Cirincione, "Assessing the Ballistic Missile Threat", Carneige Endowment for International Peace-Nonproliferation Project, http://www.ceip.org/files/Publications; Al J. Venter, "New-Era Threat: Iraq's Biological Weapons", Middle East Policy, Vol.VI, No.4, June 1999, pp.106-108; Micheal Eisenstadt, "US Military Capabilities in the Post Cold-War Era: Implications for Middle East Allies", Middle East Review of International Affairs, Vol 2, No.4, November 1998, pp.17-19.

Iraq's clandestine efforts to obtain WMD and missile capabilities made creeping proliferation a key part of the arms race in the Gulf and the Middle East. Its use of chemical weapons and missiles against Iran during the Iran-Iraq War caused Iran to become a major proliferator in return. Iraq's missile launches against Israel and Saudi Arabia during the Gulf War expanded the threat of using WMD to include the whole Gulf region. This made the problem of proliferation in the Arab-Israeli arms race and the problem of proliferation in the Gulf intertwined. It is argued that Iraq retains the technology to rapidly produce chemical and biological weapons the moment that sanctions lose all of their restraining impact.[47] Accordingly, Iraq could quickly increase the threat it could pose to key military units in Kuwait, Saudi Arabia, to western forces in the region, or to ports and air bases in Turkey. It is then important to consider how Iraq's forces can evolve while UN sanctions continue, and what Iraq is likely to do when sanctions are lifted. It is crucial to consider the threat posed by WMD and impact of any major new transfer of weapons in the future. As a consequence of all, any military analysis of Iraq must try to examine present and potential Iraqi war-fighting capabilities.

2.1 Past and Recent Developments Regarding Iraq

2.1.2 Iraqi Search for Weapons of Mass Destruction

The most serious concern with Iraq is the likelihood that it will seek a renewed WMD capability for credibility, so as to have the ability to deter other states, because every other strong regime in the region either has it or is pursuing it. Director of US Central Intelligence Agency (CIA) George J. Tenet states that the Iraqis have rebuilt key

[47] Anthony H. Cordesman, Weapons of Mass Destruction in Iraq, Center for Strategic and International Studies www.csis.org, Strategic Assessment, February 2001, p.5

portions of their chemical production infrastructure for industrial and commercial use. The plants Iraq is rebuilding, Tenet declares, were used to make chemical weapons precursors before the Gulf War and that their capacity exceeds Iraq's needs to satisfy its civilian requirements. Central Intelligence Agency estimate of Iraqi threat stresses the developments in Iraq about dual-use research, development and production in the biological weapons and ballistic missile fields. It is pointed out that Iraq has rebuilt several critical missile production complexes. [48] Iraq's stubborn rejection of the terms of the cease-fire agreement and previous judgments about Iraqi regime's characteristics give reason to extrapolating that Iraq may have begun such reconstitution efforts and that it possibly will again threaten its neighbors.

2.1 Past and Recent Developments Regarding Iraq

2.1.3 Iraqi Nuclear Program

Iraq has ratified the Nuclear Nonproliferation Treaty (NPT). Nevertheless, before the Gulf War, Iraq had a huge nuclear weapons development program [49] whose focal point was to build an implosion type device. After Operation Desert Storm, Iraqi nuclear infrastructure suffered considerable damage from coalition bombing and IAEA dismantlement. Still, it retains scientists, engineers and nuclear weapons design information.[50] It is estimated that without fissile material it would need five or more years and significant foreign assistance to rebuild its nuclear program and produce nuclear

[48] Gary Sick, "The Future of Iraq", Middle East Policy, Vol. VII, No.4, October 2000, pp. 60-61; Proliferation brief, "New Declassified 1998 Report on the Ballistic Missile Threat", and "Iraq's Breakout Potential", www.ceip.org/files/publications/Proliferation.

[49] Al J. Venter, "How Saddam Almost Built His Bomb", Middle East Policy, Vol. VI, No.3, February 1999, pp.46-61; Anthony Cordesman, "The New Balance of Gulf Arms", Middle East Policy, Vol. VI, No.4, June 1999, pp. 80-91.

devices. [51] Inspections by UN teams have found evidence of two successful weapons designs, a neutron initiator, explosives and triggering technology needed for production of bombs, plutonium processing technology, centrifuge technology, calutron enrichment technology and experiments with chemical separation technology.[52]

Iraq's main nuclear weapons facilities were of ten. "Al Atheer" being the center of nuclear weapons program. The facility had systems for uranium metallurgy, designing remote controlled systems for high explosives manufacture and production of shaped charges for bombs. At the "Al Tuwaitha" facility, Iraqis were studying on triggering systems, neutron initiators, uranium metallurgy, and hot cells for plutonium separation. There were also prototype-scale gas centrifuge, prototype electromagnetic separation facility and testing of laser isotope separation technology. Another facility, "Al Qa Qa" was used for storing high explosives and testing of detonators for high explosive component of implosion nuclear weapons. "Ash Sharqat" was designed for mass production of weapons grade material using electromagnetic isotope separation. What is more, "Al Furat" was designed for mass production of weapons grade material using centrifuge method. [53]

Iraq had three reactor programs. First, "Osiraq/Tammuz-I" was a 40 megawatt light-water reactor destroyed by Israeli air attack in 1981. "Second Isis/Tammuz-II" was an 800- kilowatt light water reactor that was destroyed by coalition air attack in 1991 during operation Desert Storm. Finally, IRT-5000 was a 5-megawatt light water reactor

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[50] Anthony Cordesman, Weapons of Mass Destruction in Iraq, Center for Strategic and International Studies-www.csis.org, Strategic Assessment, February 2001, pp. 10-14.
[51] "New US administration must reassess Iraq policy", Jane's Security, 30 January 2001, p.1.
[52] Anthony Cordesman, Weapons of Mass Destruction in Iraq, Center for Strategic and International Studies- www.csis.org, Strategic Assessment, February 2001, pp.15-18.
[53] Nuclear Weapons Database-Nuclear Facts, Federation of American Scientists Online Source, www.fas.org.

again damaged by coalition air attack in 1991. It is claimed that Iraq used calutron, centrifuges, plutonium processing, chemical defusion methods and foreign purchases to create new production capability after Israel destroyed most of Osiraq. [54] Iraq established a centrifuge enrichment system in Rashidya and conducted research into the nuclear fuel cycle to develop a nuclear device. [55]

After invading Kuwait, Iraq attempted to accelerate its program to develop a nuclear weapon by using radioactive fuel from French and Russian-build reactors. [56] It made a crash effort in September 1990 to recover enriched fuel from its supposedly safe-guarded French and Russian-built reactors, with the goal of producing a nuclear weapon by April, 1991. The program was only halted after coalition air raids destroyed key facilities in January 17,1991.[57]

On November 7, 1995, chief UN weapons inspector Rolf Ekeus announced that Iraq worked on producing a radiological weapon, which scatters deadly radioactive material without causing a nuclear explosion. [58] He disclosed that orders were given in 1987 to explore the use of radiological weapons for area denial in the Iran-Iraq War. Iraqi claims made to UNSCOM maintains that three tests were made, but the results of them were disappointing and the project was shelved. UNSCOM officials state that there has been no records or evidence to prove that it is shelved. UNSCOM believes that Iraq's

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[54] Rodney W. Jones, Tracking Nuclear Proliferation, Washington D.C.: The Brookings Institution Press, 1998, pp.184-194; Proliferation brief," CIA Reports on States Acquiring WMD", Vol.3, No.24, August 23,2000,pp.1-3

[55] Gary Sick, "The Future of Iraq", Middle East Policy, Vol. VII, No.4, October 2000, p.58; Isam al-Khafaji, "The Myth of Iraqi Exceptionalism", Middle East Policy, Vol. VII, No.4, October 2000, pp.62-64.

[56] Anthony Cordesman, Weapons of Mass Destruction in Iraq, Center for Strategic and International Studies-www.csis.org-Strategic Assessment, February 2001, pp. 27-29.

[57] "UN Says Iraq worked on radiological weapon", Reuters Information Service, 1995, p.2; Al J Venter, "Saddam and the West's worst nightmare", The Middle East Online Edition, www.africasia.com /icpubs/me/jan01/cover.htm, pp.1-5.

nuclear program has been largely disabled and remains incapacitated, but warns that Iraq retains substantial technology. Iraq also established a clandestine purchasing system in 1990 that it has used to import forbidden components since the Gulf War. Taking into consideration the time lapse from 1998 onwards, the period during which no inspections were conducted, it seems plausible to argue that Iraq reconstituted its efforts to proliferate.

UN inspection teams consistently declared that there is no reason to assume that Iraqi declarations were comprehensive. There are major uncertainties vis-à-vis Iraqi nuclear and radiological programs.[59] Accordingly, it is never known whether Iraq concealed an effective high-speed centrifuge program, or whether there are elements for radiological weapons. It is equally elusive whether Iraq is actively seeking to clandestinely buy components for nuclear weapons. It may be examining the purchase of fissile material from other countries such as North Korea, China or Russian Federation.[60] As stated before, Iraq still retains the technology developed before the Gulf War, and experts believe that an ongoing research effort continues.[61] Further, it is unclear if Iraq is sustaining its development of a missile warhead suited to the use of, and as a corollary of a nuclear device.

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[58] "UN Says Iraq worked on radiological weapon" Reuters Information Service, 1995, p.2; Cordesman, op. cit, 2001, p.20.
[59] Marc Weller, "The US, Iraq and the Use of Force in a Unipolar World", Survival, 41-4, Winter 1999-2000, pp.84-88.
[60] UNSCOM Documents, UNSCOM Repors to the Security Council – Ongoing Monitoring and Verification, 25 January 1999, www.fas.org/news/un/iraq/s/990125/index.html
[61] Report on the activities of the Special Commission during the period 17 November to 2 December 1998. www.fas.org/news/un/iraq/s/butla216.htm

Al J. Venter reports that former head of UNSCOM, Richard Butler disclosed in New York recently that the Iraqi dictator had reassembled his nuclear weapons team.[62] Since Dr. Khidhir Hamza's the most senior Iraqi nuclear physicist to have defected to the West-defection to America, he has made some astonishing disclosures. During an interview with Washington's Institute for Science and International Security (ISIS), he stated that the first and most comprehensive help received by him in his trial to build a nuclear weapon was information from the US Atomic Energy Project, which are the library copies of the 1940s Manhattan Project. [63] These copies were acquired by Iraqi students who sought for them in US university libraries. Dr. Hamza noted that certain government sectors including agriculture, oil and others were used as he put it, "as needed to smuggle equipment and obtain information not available elsewhere". He told in detail how Iraqi atomic energy smuggles equipment and obtain information clandestinely through use of various ministries. Dr. Hamza, in answering to a question as to how all this activity was kept secret from the International Atomic Energy Agencies' inspections that took place before the Gulf War, replied that "when the inspectors arrived we would just lock the doors to the areas where we were working to enrich uranium for the bomb." He goes on to tell the developments regarding build-up of a nuclear weapon in Osiraq before Israeli Air Force attacked it.[64]

Asked whether in the case of Saddam Hussein using a bomb, for example, on Israel, it would be airdropped, Dr. Hamza replied:

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[62] Al J Venter, "Saddam and the West's worst nightmare", The Middle East Online Edition, www.africasia.com/icpubs/me/jan01/cover.htm, pp.1-5; David Albright and Khidhir Hamza, "Iraq's Reconstitution of Its Nuclear Weapons Program", Arms Control Today, October 1999, pp.3-9.
[63] Ibid.

> Yes, I think that is why work is still being done now. When you have a nuclear weapon you need to harden it to take the stresses of the journey, staying together and working. This hardening we did not have in 1990. We barely managed to make a mock-up of an actual bomb without a core. Working on the actual hardening started after the [Gulf] War and I think that now they have a bomb that could stay together.[65]

Questioned on the consequences of sanctions against Iraq and how an inflow of scientists to Iraq might affect the timescale for reconstitution of viable Iraqi nuclear threat, Dr. Hamza explained:

> Right now, I don't know if the uranium is there, but the design is there. The construction is difficult and would probably take a few months. It all depends on how they get the fissile material. Saddam can either start a fissile material programme in Iraq-the enrichment programme-in which case it may take him two or three years to have it. Or he can get it smuggled from abroad, for example from Russia. Then he will have it immediately.[66]

Dr. Hamza also disclosed that the companies contacted for the procurement of a nuclear device indicated that they knew the equipment was not for peaceful purposes.

2.1 Past and Recent Developments Regarding Iraq

2.1.4 Iraqi Chemical Weapons Program

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[64]Federation of American Scientists Database, "Iraqi Nuclear Weapons", www.fas.org /nuke/guide/iraq/nuke/ program.htm, pp.8-12.
[65] Al J Venter, op. cit. p.3
[66] Al J Venter, op. cit. p.4

Since the Gulf War, Baghdad has rebuilt key portions of its industrial and chemical production infrastructure. It is not a party to the Chemical Weapons Convention (CWC). Iraq is known to have produced and stockpiled mustard, tabun, sarin, and VX, some of which likely remain hidden.[67] In late 1998, UNSCOM reported to the UN Security Council that Iraq continued to withhold information related to its chemical program.[68] Besides, UNSCOM discovered evidence of VX, a persistent nerve agent, in missile warheads in 1998 despite Iraqi denials for seven years that it did not weaponize VX. In revelations to the UN, Iraq admitted that prior to the Gulf War, it maintained large stockpiles of mustard gas, and the nerve agents sarin and tabun. [69] It also admitted that it produced binary sarin filled artillery shells, 122 mm rockets, and aerial bombs. Iraqis, later on, were forced to accept that they manufactured enough precursors to produce 70 tons of the nerve agent VX. They tested ricin, which is a deadly nerve agent for use in artillery shells, most importantly, Iraqi administration accepted that it conducted three flight tests of long-range Scuds-ballistic missiles-with chemical warheads. [70] The destruction of the related weapons and feedstocks has not been verified by UNSCOM. Iraq is claimed to have at least 3,800 kg's of V-agents by the time of the Gulf War, and 12-16 missile warheads. During 1991-1994 period, UNSCOM supervised the destruction of 690 tons of chemical warfare agents and more than 3,000 tons of precursor chemicals. The majority of Iraq's chemical agents were manufactured at a supposed pesticide plant located at Muthanna. Muthanna State Establishment is Iraq's primary CW research,

[67] Anthony Cordesman, The Iraqi Threat After Desert Fox, Washington D.C.: CSIS Pub. , January 28,1999, pp.38-40 (also online available at www.csis.org)
[68] An interview with Ambassador Rolf Ekeus, former head of UNSCOM by Arms Control Today, "Shifting Priorities: UNMOVIC and the Future of inspections in Iraq, Arms Control Today, March 2000, pp.3-6.
[69] Federation of American Scientist Database, "UNSCOM and Iraqi Chemical Weapons", www.fas.org/nuke/guide/iraq/cw/unscom.htm, pp.2-6.

production, filling and storage site. Other production facilities include Salman Pak, Samara and Habbiniyah. UNSCOM reports indicate that Iraq possesses the technology to produce a variety of persistent and non-persistent chemical agents.[71] In addition to that UNSCOM reports that Iraq has failed to account for special missile warheads intended for filling with chemical or biological warfare agent. Iraq also did not account for 107,500 empty casings for chemical weapons. Iraq has developed basic chemical warhead designs for Scud missiles, rockets, bombs, and shells. Iraq also has spray dispersal systems. The UN team of experts states that Iraq has offered no evidence that it has destroyed its VX production capability and stockpile.[72] UNSCOM in its 1998 report to UN Security Council, points out the fact that Iraq continues to withhold information regarding its chemical program. UNSCOM inspectors discovered an Air Force document indicating that Iraq did not consume as many CW munitions during the Iran-Iraq War as declared by Baghdad. The report shows that Iraq may have an additional 6,000 CW munitions hidden. According to Rolf Ekeus, Iraq is not eager to store any CW or BW. Iraq views, he argues, those weapons as tactical assets instead of strategic assets. Iraq has been aiming to keep the capability to start up production immediately should it needs to.[73] The State Department of US report in September 1999 notes that Iraq continues to deny weaponizing VX nerve agent despite the fact that UNSCOM found VX nerve agent residues on Iraqi Scud missile warhead fragments, International experts concluded that

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[70] Anthony Cordesman, Weapons of Mass Destruction in Iraq, Center for Strategic and International Studies – www.csis.org, Strategic Assessment, February 2001, pp.10-13.
[71] Al J. Venter, "New-Era Threat: Iraq's Biological Weapons", Middle East Policy, Vol. VI, No.4, June 1999, p.110.
[72] Howard Diamond, "Iraqi Nuclear File Kept Open, New VX Concerns, "Arms Control Today, June/July, 1999, pp. 1-2; "Letter from the Executive Chairman of UNSCOM to the President of the Security Council", 26 October 1999, www.fas.org/news/un/iraq/s/s98-995.htm

Iraq has the know-how and process equipment, and may have enough precursors to manufacture 200 tons of VX. Directorate of Intelligence Nonproliferation Center reported in February 2000 that there is no direct evidence that Iraq has used the period since Desert Fox to reconstitute its WMD programs, though given its past behavior, this type of activity must be regarded as likely.[74] The UN assesses that Baghdad has the capability to reinitiate both its CW and BW programs within a few weeks to months.[75]

2.1 Past and Recent Developments Regarding Iraq

2.1.5 Iraqi Biological Weapons Program

For four year (1991-1995) Iraq has claimed that it conducted only defensive research on biological weapons. In 1995, Iraq reluctantly admitted it produced anthrax, botulinum toxins and aflatoxins and that it prepared biological agent-filled munitions such as missile warheads and aerial bombs.[76] UNSCOM believes that Iraq produced greater amount of bioagents than it admitted. Iraq also admitted that during the Persian Gulf War, it deployed biological agent-filled munitions to airfields. Iraqi administration

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[73] An interview with Ambassador Rolf Ekeus, former head of UNSCOM, by Arms Control Today, "Shifting Priorities: UNMOVIC and the Future of Inspections in Iraq", Arms Control Today, March 2000, pp.3-6.

[74] "The Residual Threat", Federation of American Scientists, www.fas.org/nuke/guide/iraq/missile/scud info /index.html, p.1.

[75] Erik J. Leklem, "Iraqi BW Program May Be Key to Stand off with UN", Arms Control Today, October 1999, p.2; "The State of Nuclear Proliferation 2001", Arms Control Today Online Edition, pp.2-3; Howard Diamond, "Iraq Blocks UNSCOM Monitoring; Security Council Calls for Review", Arms Control Today, October 1999, p.2; UNSCOM Chairman Butler's report to UN Secretary General, 15 December 1998,p.4; "UNSCOM and Iraqi Chemical Weapons", Federation of American Scientists, www.fas.org/nuke/guide/ iraq/cw/unscom.htm; Federation of American Scientists News Line, "Saddam Said to be Close to Nuclear Arsenal", RFE/RL Iraq Report, Vol.3, No.42, 15 December 2000, Online available at www.fas.org/news/iraq/2000.

[76] Anthony Cordesman, Weapons of Mass Destruction in Iraq, Center for Strategic and International Studies-www.csis.org, Strategic Assessment, February 2001, pp.14-19; Erik J, Leklem, "Iraqi BW Program May Be Key to Standoff with UN", Arms Control Today, October 1999, p.1; Peter Sullivan, "Iraq's Enduring Proliferation Threat", National Defense University-Strategic Forum, Number 95, November 1996, pp.1-5, www.ndu.edu/inss/ strforum/forum95.html.

disclosed that these weapons were intended to use against Israel and coalition forces in Saudi Arabia. [77] UNSCOM believes that Baghdad has the ability to reconstitute its biological warfare capabilities in the absence of inspections and monitoring during 1999 and 2000.[78]

Iraqi endeavors to produce BW are of economic origin. Due to economic sanctions, biological weapons are extremely attractive to opt for: Casualties might cost $2000 per square kilometer with conventional weapons, $800 with nerve gas (CW), and a single dollar with biological weapons.[79] Richard Butler, one of the former executive chairman of UNSCOM said in an interview that "biological weapons are easier and cheaper to make than any other arms and can be deployed with less difficulty". Another official, a spokesman for UNSCOM, Ewen Buchanan explained that 30 tons of Iraq's biological warfare agents were unaccounted for. The list included 1,900 liters of botulinum toxin, 8500 liters of anthrax and two tons of aflatoxins, which if dispersed in aerosol and droplet clouds could in theory poison the entire world.[80] He adds that 30 tons of unaccounted bioagents are only Iraq's declaration, and warns that Iraq may hide more of them.

In the desert, a short distance from the Tigris River, about 60 km.s southwest of Baghdad, is where Al Hakam locates. Iraqi officials told UNSCOM inspectors four year ago that Al Hakam was involved in the production of single-cell protein in yeast as a supplement for chicken food and in the cultivation of BT (bacillus thuringiensis), a

[77] Al J. Venter, "New-Era Threat: Iraq's Biological Weapons", Middle East Policy, Vol.VI, No.4, June 1999, p.108; Cordesman, op cit.2001, pp.2-3.
[78]UNSCOM Reports to the Security Council, 25 January 1999, www.fas.org /news /un/ iraq /s/ index.html
[79] "Iraq's Breakout Potential", Proliferation Brief-Carneige Endowment for International Peace, September 22,1998, www.ceip.org/files/publications/ProliferationBrief; Venter, op cit.1999, p.104.
[80] Ibid.

bacterium that acts as an insecticide when applied to crops. Al J Venter states that it took UN inspectors four more years to discover that the Iraqi declarations do not reflect the truth and that Al Hakam was the key to Iraq's BW program. Mass production of anthrax was started there in 1989. Eventually, 8500 liters of liquid with an anthrax spore were produced, and most was used to fill weapons.[81] Iraq later admitted to Rolf Ekeus that it had produced half a million liters of botulinum toxin and anthrax and that research on mycotoxins had begun. Iraqis, upon the pressure of UNSCOM, admitted that Al Hakam was the site of a plant, producing agents for biological warfare. This was shortly before the defection of Saddam Hussein's son-in-law Lt. General Hussein Kamel Hassan, notes Venter. Hassan provided information about 25 warheads, 16 of which were filled with botulinum toxin, 5 with anthrax and 4 with aflatoxin. By his own account, there were enough of the first two agents, under optimum conditions, to kill a million people.[82] UNSCOM's subsequent disclosures in Iraq revealed those missiles General Hassan mentioned. They were hidden in railway and irrigation tunnels or buried on the banks of the Tigris River to protect them from bombing raids. Later, Iraqis claimed that all of them were transported to a desert site called Nebai and destroyed.[83] The UN officials expressed doubts that this was realised. Therefore, Iraq may still have ballistic missiles weaponised with bioagents. The Defense Intelligence Agency and Central Intelligence Agency both reported that during the Gulf War, original photos of Su-22 Sukhoi aircraft taken by the US paved the way to think about a possible biochemical spray tank because the photo shoved an air scoop on the top front of the tank. There are also reports that a Mirage F1 at

[81] Anthony Cordesman, The Iraqi Threat After Desert Fox, Center for Strategic and International Studies-www.csis.org, Strategic Assessment, January 18, 1999, pp.40-41.
[82] Al J Venter, op cit.p.106.

Kut Air Force Base of Iraq existed during the Gulf War with belly-drop tanks, which could carry 2,000 liters of biological media.[84]

In a publication of World Health Organisation (WHO) in 1970, an idea of the damage that might be caused by one aircraft spraying a single biological agent is given. If dried anthrax of 50 kgs is sprayed in a suitable aerosolized from, it would affect an area in excess of 40 sq. kms, it states. [85] It is instructive that British germ warfare experiments in 1942 with anthrax on Gruinard Island off the coast of Scotland caused the place to be evacuated for more than 40 years. Tests conducted in 1981 showed that anthrax spores were still detected in 20 out of 153 soil samples most of which were embedded to three inches in the ground.

Other UNSCOM work revealed that Salman Pak, an average-sized site, about 40 km. out of Baghdad were among places where various biological warfare studies occurred. Anthrax, botulinum toxin, gas gangrene and fungal toxins were among tasks performed at Salman Pak.[86]

2.1 Past and Recent Developments Regarding Iraq

2.1.6 Iraqi Delivery Systems

Prior to the Gulf War Iraq had extensive delivery systems incorporating long-range strike aircraft with refueling capabilities and several hundred long-range Scud missiles, some with chemical warheads. These included Tu-16 and Tu-22 bombers, MIG-

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[83] Michael Eisenstadt, "Iraq's WMD: An Emerging Challenge for the Bush Administration", The Washington Institute for Near East Policy-PolicyWatch, January 29, 2001, p.3.
[84] Ibid.
[85] Al J Venter, op cit. p.107
[86]"UNSCOM and Iraqi Chemical Weapons", Proliferation Fact Sheets, ww.fas.org/nuke/guide/iraq/cw/unscom.htm; Seventh Report of the Executive Chairman on the activities of UNSCOM, 8 October, 1999, www.fas.org/news/un/iraq/s/index.html.

26 fighters; Mirage F-1,MIG-23 BM, and Su-22 fighter attack aircraft and a Scud force with a minumum of 819 missiles. These ballistic missiles included extended range 'Al Husayn' variants (600 kilometer range) extensively deployed throughout Iraq. Iraq was developing 'Al-Abbas' missiles (900 kilometer range) which could reach targets in Iran, the Persian Gulf, Israel, Turkey, and Cyprus. What is more, Iraqi attempts to develop weapon systems comprised also of long-range super guns with ranges of up to 600 kilometers. Prior to the Gulf War, Iraq also engaged in efforts aimed at developing 'the Tammuz' liquid fueled missile with a range of over 2,000 kilometers.[87]

After the Gulf War, UNSCOM verified Iraqi unilateral destruction of 83 missiles and 9 mobile launchers. UNSCOM also supervised the destruction of 48 operational missiles, 14 conventional missile warheads, 30 missile chemical warheads, other missile support equipment and materials, and a variety of assembled and non-assembled supergun components. The entire Al-Hakam biological weapons production facility and a variety of production equipment for missiles were also among the facilities and equipment-destroyed.

UNSCOM reports point out that it is accountable for 817 of the 819 missiles that Iraq imported in the period ending in 1988.[88]Iraq maintains that it has a stockpile of HY-2,SS-N-2, and C-601 cruise missiles which are unaffected by UN cease-fire terms. Center for Strategic and International Studies (CSIS) reports that US experts believe Iraq may

[87] "Foreign Missile Developments and the Ballistic Missile Threat to US Through 2015", National Intelligence Council, September 1999, pp.8-9; "US Dilemmas: Iraq and Iran", Intelligence Digest, http://newsite.janes.com/ security/international_security/news/jid; Michael Eisenstadt, "Iraq's WMD: An Emerging Challenge for the Bush Administration", The Washington Institute for Near East Policy-PolicyWatch, January 29,2001,p.2; "Project Babylon Supergun/PC-2", Iraqi Capabilities, www.fas.org/nuke/guide/iraq/other/supergun.htm

[88] "New Declassified 1998 Report on the Ballistic Missile Threat", Proliferation Brief, Vol.1, No.13, Carneige Endowment for International Peace, www.ceip.org / files/ publications/ ProliferationBrief113;

still have components for several dozen extended-range Scud missiles. If it is the case, Iraq may target Turkey in the near future owing to the extended-ranges of Al-Abbas-type missiles. [89] Iraq has admitted hiding its capability to manufacture its own Scuds, and developing an extended range variant of the FROG-7 called 'the Laith'. Iraq has also admitted experimenting with cruise missile technology and ballistic missile designs with ranges up to 3,000 kilometers.

A critically important project Iraq conducted was 'Project 144' in which Iraqis tried to develop biological warheads for the Al Husayn missile. They also successfully developed and tested a warhead separation system. Another means of delivery that was under study was the research into the development of remotely piloted vehicles (RPVs) for the dissemination of biological agents. [90] All these Iraqi endeavours are crucial because Iraqi administration is successful in its attempts to deny their capabilities. They were reported to be increasingly uncooperative in response to UNSCOM's effort to establish a record of Iraq's past ballistic missile programs. In November 1996, Howard Diamond reports, Iraq refused to permit UNSCOM to take 150 destroyed missile engines, which Baghdad claims it destroyed and buried in the summer of 1991. [91] UNSCOM inspectors were unable to verify that they were destroyed. Furthermore, former UNSCOM Head Rolf Ekeus stated, on February 1999, that Iraq has managed to retain an operational force of ballistic missiles in violation of UN prohibitions against possessing

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Anthony Cordesman, The Problem of Paradigm Shifts, Middle East Studies Program-Center for Strategic and International Studies, www.csis.org/mideas/reports/terror.html

[89] Anthony Cordesman, The Iraqi Threat After Desert Fox, Washington D.C.: CSIS Publications, January 1999, pp.17-19, also available at www.csis.org/mideast/reports/terror.html

[90] "Foreign Missile Developments and the Ballistic Missile Threat to US Through 2015", National Intelligence Council, September 1999, pp.9-11.

[91] Howard Diamond, "UNSCOM Head Says Iraq has Operational Missile Force", Arms Control Today, January/February 1999, www.armscontrol.org/act/unscom

such weapons with ranges above 150 kilometers. [92] He pointed out that UNSCOM has long suspected Iraq of possessing missile capabilities beyond those permitted under UNSCR 687. Ekeus' assessment indicates that Baghdad may have an operational force of between 18 and 25 Scud and Scud variant missiles.

IRAQI MISSILE STOCKPILE

Designations	Propellant	Range	Status
Al Fahd 500	Solid+liquid	500 km	Destroyed
Badr-2000 Project 395	Solid	----	Destroyed
Project 144 Project 1728	Liquid	2,000 km	Destroyed
Tammuz-1	Liquid	2,000 km	Destroyed
Al Abid Tammuz-2	Liquid	3,000 km	Destroyed
Ababil-100	Liquid	100-150 km/300 kg	Development
Al Samoud	Liquid	150 km/300 kg	Tested/Development
Scud-B	Liquid	300 km/1,000 kg	Destroyed
Al Hussein	Liquid	600-650 km/500 kg	Destroyed
Al Abbas	Liquid	900 km/300 kg	Destroyed

2.2 Iran's Weapons of Mass Destruction Capability

[92] Ibid.

It is becoming progressively easier to produce WMD without extensive imports due to the fact that petrochemical and industrial plants along with the insecticide plants steadily extended to the region in general. Dual-use technology is the foremost advantage of proliferators enabling them to implement simulated tests, carry out weapons designs and manufacture. It appears that IAEA inspections can help prevent these efforts, but can also help disguise proliferation if 93+2 regime (the new inspection procedures) and methods such as environmental sampling and surprise inspections will not work.[93] The BTWC has no enforcement provisions and prospects for establishing them in the Middle East are not encouraging at all[94]. Advances in biotechnology, and pharmaceuticals may give Iran, Iraq, and Syria the ability to mass-produce "dry storage BW" in aerosol form[95]. The Missile Technology Control Regime (MTCR) is influential in slowing the spread of missiles, but it is not a panacea for the lure of missiles. All three states (Iraq, Iran and Syria) have long-range strike aircraft and unconventional delivery options. They all know that there is a need to purify and stabilise mustard and nerve agents to acquire lethal warhead technology. They all have nerve gas technology.

Notwithstanding President Khatemi's moderation of the regime's anti-Western position and rhetoric, Iran is still one of the most active countries seeking to obtain

[93] As evidenced by UNSCOM, there are limits to the importance of NPT measures. The safeguards used to verify compliance with the NPT failed in Iraq and the weaknesses have not yet been redressed completely. Although Iran has said it will accept the improved 93+2 safeguards when they are adapted more widely, it is far from certain that new safeguards regime will be realised by the Middle Eastern states in general, and by Iran in particular. Iran seems to be prudent by using its diplomatic tools effectively vis-à-vis arms control treaties and related measures.

[94] Eric Arnett, "Iran, Threat Perception and military confidence-building measures", Sipri Projects, http://projects.sipri.se/technology/Iran-CBM.html, pp.1-2,

[95] Anthony Cordesman, Weapons of Mass Destruction in the Middle East, Washington D.C.: CSIS Publication, 2001, pp.51-53. Also available at www.csis.org, military balance.

CBRN and missile technologies[96]. Although Iran acceded to the NPT, and signed the CTBT, its main drive for nuclear related equipment, material and know-how continues. Such programs are continuing with support from Russia, North Korea and China[97]. Iran pursues independent production capability for its weapons programs, and made outstanding progress among other Middle Eastern states in regard with chemical, biological and ballistic missile development programs. Iran disclosed its effort through public displays of missiles and declarations on them[98]. In July and September 2000, flight tests of the Shahab-3 reflected Iran's intent to project military influence throughout the region[99]. Iran's defense budget, like many other Middle East countries, has priority in its oil-based economy. It is estimated to be $6 billion for the fiscal year of 20 March 2001, 3 percent of its GDP.

2.2 Iran's Weapons of Mass Destruction Capability

2.2.1 Iranian Endeavors to Proliferate

It is asserted that Iran seeks to obtain whole facilities that could be used to

[96] Cordesman, op. cit. p.51; Robert Walpole, "The Iranian Ballistic Missile and WMD Threat Through 2015", Statement for the Record to the International Security, Proliferation and Federal Services Subcommittee of the Senate Governmental Affairs Committee, September 21, 2000, pp.2-7, www.nyu.edu/globalbeat/mideast/

[97] Walpole, op. cit. p.5; W. Seth Carus, "Iran and WMD", Middle East Review of International Affairs, Vol.4, No.3, September 2000, p.2-6; Michael Eisenstadt, "Living with a Nuclear Iran?" Survival, Vol/41, No.3, Autumn 1999, pp.124-132; Reuters Business Briefing Article, "EU: EU/US-Softening of US Policy On 'Rogue Nations' Iran, Cuba and Libya", 18 July 2001, Reuters; Reuters Business Briefing Article, "China: US plans expert talks with China on missile sales", 28 July 2001, Reuters; Arnett, op. cit. p.7; Yitzhak Shichor, "Mountains out of Molehills: Arms Transfers in Sino-Middle Eastern Relations", Middle East Review of International Affairs, Vol.4, No.3, September 2000, pp.2-8; Oksana Antonenko, "Russia's Military Involvement in the Middle East", Middle East Review of International Affairs, Vol.5, No.1, March 2001, pp.2-16; Barry Rubin, "North Korea's Threat to the Middle East and the Middle East's Threat to Asia", Middle East Review of International Affairs, Asia Book, September 1999, pp.3-15.

[98] Walpole, op. cit. p.7; Cordesman op. cit.p.57

[99] Rubin, op. cit. pp.7-9; Cordesman op. cit.p.59.

produce fissile materials for a nuclear weapon[100]. Fissile materials are potentially available in black market that is one of the ways Iran may choose. Iran's rhetoric is that it has a vital need to establish a nuclear fuel cycle for its civilian energy program. However, it does not seem to be plausible given that Iran has vast reserves of natural gas and oil enough for the long foreseeable future[101]. Seemingly, this is still one of the methods of acquiring fissile material for a nuclear weapon. Another option for a weapon acquisition is stealing it from the former Soviet Russian territories.

Iran is claimed to be seeking fissile material and related nuclear technology for weapons development, especially from sources in Russia[102]. Russian Federation is continuing to work on a 1,000-megawatt power reactor at Bushehr and Bushehr will fall under IAEA safeguards. Nevertheless, Iran may use this project to have access to more sensitive nuclear technologies from Russia and to develop their expertise on the field. In that guise, it may strengthen its nuclear infrastructure, which would in turn be supporting nuclear weapons research and development. China has been another major supplier of nuclear-related facilities and technology. It has undertaken three projects with Iran, a small research reactor and a zirconium production facility, and finally a uranium conversion project. This project could give Iran the means to produce uranium hexafluoride or uranium dioxide, which are feedstocks for manufacturing weapons grade plutonium. China pledged that it would stop these projects and announced new export

[100] Cordesman op. cit.60; Rubin op cit.10; Michael Eisenstadt, "The Armed Forces of the Islamic Republic of Iran: An Assessment", Middle East Review of International Affairs, Vol.5,No.1, March 2001, pp.8-17; George Tenet, "WMD: A New Dimension in US MiddleEast Policy", Vol.4, No.2, June 2000, pp.8-10; Mustafa Kibaroğlu, "Is Iran Going Nuclear?" Foreign Policy, December 1996, Vol.20, No.314, Foreign Policy Institute, Ankara, pp.35-49.

[101] Kibaroğlu, op. cit. pp.35-38.

[102] Antonenko, op cit. pp.8-15; Eisenstadt op cit.p.9; Stephen C. Fairbanks, "Iran: No Easy Answers", Journal of International Affairs, Vol.54, No.2, Spring 2001, pp.462-463; Michael Eisenstadt, "Russian

controls covering dual-use nuclear equipment.

Iran is also believed to be pursuing biological warfare capabilities[103]. It may have small quantities of usable agents. Iran ratified the BTWC. As for the chemical program, Iran began chemical warfare program during Iran-Iraq war, and, although poorly known it employed limited amounts of agent against Iraqi troops[104]. It has weaponized stockpile of agents, is capable of agent delivery and trains military forces to operate in contaminated environment. In short, Iran seems to be capable of conducting a chemical warfare. It ratified the CWC and made declarations on it.

2.2 Iran's Weapons of Mass Destruction Capability

2.2.2 Iranian Missile Program and Other Means of WMD Delivery

Iran is producing Scuds like Syria does; its ballistic missile force comprises of SCUD-B, SCUD-C and Chinese-made CSS-8 SRBMS. Its main effort is to mass-produce Shahab-3 MRBM that is allegedly based on North Korean No Dong[105]. This effort is estimated to involve huge Russian and Chinese assistance[106]. Persians also declared that they are trying to enhance the range and envision adding Shahab-4 and Shahab-5 to their arsenal.[107] In addition to the ballistic missiles, Iran has other means of delivery available such as land- sea- and air-launched anti-ship cruise missiles and air launched tactical

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Arms and Technology Transfers to Iran:Policy Challenges for the United States",Arms Control Today,March 2001,pp.2-12

[103] Anthony Cordesman, Weapons of Mass Destruction in the Middle East, Washington D.C.: CSIS Publication,2001, pp.66-68; Disarmament Diplomacy CIA WMD Report Issue No.49, pp.1-16, www.acronym.org.uk/49wmd.htm

[104] Javed Ali, "Chemical Weapons and the Iran-Iraq War: A Case Study in Noncompliance", The Nonproliferation Review, Spring 2001, pp.43-55.

[105] "Iran's Shahab-3 Missile", Middle East Intelligence Bulletin, Vol.2, No.7,5 August 2000,pp.1-2.

[106] Robert O. Freedman, "Russian-Iranian Relations in the 1990s", Middle East Review of International Affairs, Vol.4, Number 2, June 2000, pp.3-10.

[107] Cordesman, op. cit p.69, 2001.

missiles. If one day they have nuclear warheads loaded on ballistic missiles, then certainly they will have the means with which they can deter or intimidate their neighbours.

Iran has increased emphasis on its ballistic missile program. Currently, it has several hundred SCUD-Bs and SCUD-Cs and Chinese-made CSS-8 (Short-range ballistic missiles) SRBMs. Having received production assistance from North Korea, it is reported to be now producing SCUD missiles[108]. In recent years, Russian and Chinese entities are reported to have supplied a wide variety of missile-related goods, technology and expertise to Iran[109]. It is maintained that Iran's potential to be a supplier is gradually increasing. Its recent efforts have been on the development of the 1300 kilometer range Shahab-3 missile which is estimated to be based on the North Korean No Dong. Iran flight-tested the Shahab-3 in July 1998, and July and September 2000. At this time, Iran likely has the capability to deploy limited numbers of Shahab-3. It has publicly displayed prototypes of this MRBM and may have an emergency operational capability for it. Robert Walpole argues that Tehran probably has a small number of Shahab-3 s available for use in a conflict and it has announced that production and deployment has begun. Shahab-3 is a medium-range ballistic missile which will allow Iran to reach Israel, most of Saudi Arabia and Turkey. That is, it could deploy a limited number of the missiles during a perceived crisis. Hence, it is unlikely for the Turkish army to involve in a Kardak/Imia-like rapidly escalating crisis when confronted with Iran. In July 2000, prior to the missile's second test flight, the commander of Iran's Revolutionary Guards Corps

[108] Freedman, op.cit.p.7.
[109] Yitzhak Shichor, "Mountains out of Molehills: Arms Transfers in Sino-Middle Eastern Relations", Middle East Review of International Affairs, Vol.4, No.3, September 2000, pp.9-10; Antonenko, op. cit. p.14.

stated that Iran had formed Shahab-3 units and built launching pads for the missiles[110]. While this may overstate and exaggerate Iran's current capabilities, it clearly illustrates Iran's intent.

Though later it has been categorized as a space launch vehicle with no military applications, Iran's Defense Minister publicly acknowledged the development of the Shahab-4, and has also mentioned plans for a Shahab-5, which may be an (Intercontinental ballistic missile) ICBM, or a space launch vehicle (SLV)[111.]

Such statements together with the sustained cooperation with Russia, North Korea and China suggest that Tehran may intend to develop and deploy a longer-range ballistic missile capability. In addition, Iran may have an ICBM ambition. Testing a space launch vehicle is almost synonymous with ICBM ability, and Iran is estimated to have it within the next 15 years[112].

Iran has purchased land-, sea-, and air-launched short-range cruise missiles from China[113]. It possesses numerous foreign-made air-launched short-range tactical missiles, which are potential means of delivery for CBRN weapons. Many of these weapon systems are deployed as anti-ship weapons in or near the Persian Gulf. Tehran could try to purchase land attack cruise missiles to complement its ballistic missile force. Iran has

[110] Walpole, op cit.p.3; Cordesman, op cit.p.70
[111] Ibid.
[112] Ibid.
[113] Anthony Cordesman, WMD in Iraq, Delivery Systems, and CBN Programs, CSIS Online Edition, April 28, 1998, www.csis.org-Middle East Program, pp.5-7.

also a variety of fighter aircraft, artillery, and rockets available as other potential means of delivery for CBRN weapons[114].

Iran's air delivery systems include SU-24 long-range strike fighters with ranges and payloads almost equivalent to US F-111 and F-4D/E fighter-bombers with capability to carry huge payloads to ranges of 450 miles. It can modify HY-2 silkworm missiles and SA-2 surface-to-air missiles to deliver WMD[115]. 'The Iran-130' or 'Nazeat' is available since the end of the Iran-Iraq War. It is a solid fuel rocket with a simple inertial guidance system to reach ranges of about 90-120 kilometers. 'The Shahin' which can be equipped with three types of warheads is being developed[116]. It can be equipped with a 180-kilogram high explosive warhead, warheads using high explosive submunitions, and a warhead of chemical agents. Finally, Iran has Oghab (Eagle) rocket with 40 kilometers range. It has large numbers of multiple rocket launchers and tube artillery for short-range delivery of chemical weapons.

In 1990, as shorter missile range systems, Iran bought CSS-8 surface-to-surface missiles (converted SA-2s) from China with ranges of 130-150 kilometers. It has Chinese sea and land based anti-ship cruise missiles with which Iran hit one US-flagged tanker, and fired 10 such missiles at Kuwait during Iran-Iraq War.[117] The Soviet designed SCUD B (17E) guided missile forms the core of Iran's ballistic missile force. Iran possibly acquired its Scuds in response to Iraq's invasion, obtained a limited number from Libya,

[114] Ibid, pp.1-10.
[115] Dennis M. Gormley, "Hedging Against the Cruise Missile Threat", Survival, Vol.40, No.1, Spring 1998, pp.92-100.
[116] Rodney W. Jones (ed.), Tracking Nuclear Proliferation, Washington D.C.: The Brookings Institution Press, 1998,pp.170-174.
[117] Javed Ali, op cit. p.47.

and then obtained larger numbers from North Korea. It fired its first Scuds in March 1985. It fired 14 Scuds in 1985, 8 in 1986, 18 in 1987, and 77 in 1988. Iran fired 77 Scud missiles during a 52 day period-the war of the cities- in 1988. Sixty-one were fired at Baghdad, nine at Mosul, five at Kirkuk, one at Takrit, and one at Kuwait.[118] Iran fired as many as five missiles on a single day and once fired three missiles within 30 minutes.

Most estimates indicate that Iran now has 6-12 Scud launchers and up to 200 Scud B (R-17E) missiles with 230-310 km. range[119]. Some estimates give higher figures: They estimate that Iran bought 200-300 Scud Bs from North Korea between 1987 and 1992, and might have continued to buy such missiles after that time. Some experts also believe that Iran can now manufacture all of the Scud Bs, with the exception of the most sophisticated components of its guidance system and rocket motors[120]. This makes it difficult to estimate how many missiles Iran has in inventory and can acquire over time, as well as to estimate the precise performance characteristics of their missiles since they can alter them. They can alter, for instance, the burn time, or the weight of the warhead. Iran also has new long-range North Korean Scuds –SCUD Cs-with ranges nearly 500 km. Iran probably had more than 60 Scud Cs by 1998. Iran may have 5-10 Scud C launchers, each with several missiles.[121]

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[118] Cordesman, op. cit. 1998, p.18.

[119] Federation of American Scientists-Factsheets, www.fas.org/Publications/iran; Cordesman, op. cit, 2001, p.71; (The Scud B is a relatively old Soviet design which first became operational in 1967 designated as the R-17E or R300E. The Scud B has a range of 290-300 kilometers with its normal conventional payload. It has a nominal (Circular Error Probable) CEP of 1,000 meters. The Russian versions can be equipped with chemical and nuclear warheads. Scud B has a single stage storable liquid rocket engine and is usually deployed on the MAZ-543 eight-wheel transporter-erector-launcher (TEL). It has a strap-down inertial guidance, using three gyros to correct its ballistic trajectory, and uses internal graphite jet vane steering. The warhead hits at a velocity above Mach 1.5)

[120] Aaron Karp, "Lessons of Iranian Missile Programs for US Nonproliferation Policy", The Nonproliferation Review, Vol.5, No.3, Spring/Summer 1998, pp. 712.

[121] Ibid.

Iran seems to want enough missiles and launchers to make its missile force highly dispersible. Accordingly, there are reports indicating Iran deployed Scud Cs, testing a highly dispersed force structure, as part of the exercise Saeqer-3 (Thunderbolt 3). Scud Cs are thought to be developed by the North Koreans with the help from China.[122] While it is often called a 'Scud C' it seems to differ very much from the original Soviet Scud B, and seems to be based more on the Chinese-made DF-61. The North Korean missiles are estimated to have a range around 310 miles (500 km.), a warhead with a high explosive payload of 700 kg, and relatively good accuracy and reliability. Although this payload is a little bit limited for the delivery of chemical agents, Iran may modify the warhead to increase payload at the expense of range restricting the using of chemical munitions to the most lethal agents such as persistent nerve gas. Iran might also consider arming its Scud C force with biological agents. In any case, these missiles have enough range and payload to give Iran the ability to strike all targets on the southern coast of the Gulf and all of the populated areas in Iraq[123]. Iran could also reach targets in part of eastern Syria, the eastern third of Turkey, and cover targets in the border area of the former Soviet Union, western Afghanistan, and western Pakistan.[124] However, accuracy and reliability remain big uncertainties, as does circular error probable (CEP).

Iran is developing an indigenous missile production capability with both solid and liquid fueled missiles. One plant is claimed to be located outside Karaj, near Tehran at the Defense Technology and Science Research Center, which is a branch of Iran's Defence Industry Organization. Iran's largest missile assembly and production plant is

[122] Joseph Cirincione, "Assessing the Ballistic Missile Threat", Nonproliferation Project-Carneige Endowment for International Peace and Testimony before the US Senate, www.ceip.org/files/Publications/Senate Testimony
[123] Cordesman, op. cit, 2001, pp.52-53

said to be a North Korean-built facility near Isfahan. Another missile plant is said to be located near Semnan, 175 kilometers east of Tehran.[125] This plant is supposed to produce 600-1000 Oghab rockets per year and the Iran-130. Another estimated facility is near Bandar Abbas for the assembly of the Seersucker. Anthony Cordesman asserts that there have been reports that Iran is developing extended range Scuds with the support of Russian experts, and a missile called the Tondar 68 with a range of 700 kilometers. There were, Cordesman asserts, many reports during early 1990s that Iran ordered the North Korean No Dong missile which was planned to have the capability to carry nuclear and biological missiles with ranges of up to 900 kilometers. This range of No Dong would allow the missile reach to any target in the Gulf, in Turkey, and Israel.[126] However, the status of the North Korean No Dong program remains uncertain, as is the case for the No-Dong 1 and the Taepo Dong 1 and 2. These latter missiles are highly effective on range and velocity. Since the early 1990s, Iran is suspected of developing longer-range variants of the No Dong for indigenous production with substantial Russian and some Chinese help.[127] This endeavor is thought to explain the background to Iran's new Shahab system. Shahab missiles included performance similar to those previously identified with Iranian missiles adapted from North Korean designs. No Dong has a range of 500 km and No Dong 1 has that of 1,000 to 1,300 km. Shahab (meteor) missiles might have been based on No Dongs for it is a liquid-fueled missile with a range of 810 miles, roughly the same range. Thus it seems logical to argue that Chinese and Russian support is central in Iranian pursuit of CBRN.

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[124] Ibid.
[125] Cordesman, op. cit, 2001, p.55
[126] Cordesman, op. cit, 2001, p.54
[127] Antonenko, op. cit, p.15.

Iran tested the Shahab on July 21 1998 claiming that it was a defensive action to deal with potential threats. General Mohammad Bagher Qalibaf, Head of the Islamic Revolutionary Guards Corps' air wing reported on August 2,1998 that the Shahab-3 is a very accurate weapon.[128] President Mohammad Khatami on August 1, 1998 stated that Iran was determined to continue to strengthen its armed forces, regardless of international concerns: "Iran will not seek permission from anyone for strengthening its defense capability."[129]

Iran publicly displayed the Shahab-3 on its launcher during a parade on September 25, 1998, the missile carrier bore signs saying "The US can do nothing" and "Israel would be wiped from the map." The Shahab was tested in a launch from a transport-erector-launcher (TEL) from a new air base at Mashad on February 20, 2000, and successfully demonstrated the integration of the engine and missile subsystems. Iran's third test came again in 2000, in July. Jane's Defense Weekly claimed that Israeli officials and US believe that the Shahab-3 was now ready for deployment.[130] Iran's Defence Minister Admiral Ali Shamkhani has said a larger missile, Shahab-4, was in production as a vehicle for launching satellites into space. Israel's army chief, Lieutenant-General Shaul Mofaz, told Israel Radio that combined development of the missile and a non-conventional capacity posed a threat not only to Israel, but also any country within range of the missile. What is more, Iran tested a solid-state missile it called the Shahab-D on September 20,2000. Iran also successfully test-fired an anti-armor missile capable of destroying the most sophisticated armoured equipment on 31 July 2001. Iranian News Agency stated that the test-fire of Sa'eqeh (Lightning) missile as proof of Iran's ceaseless

[128] Cordesman, op. cit, 2001, p.56
[129] Cordesman, op cit, 2001, p.54

efforts made by the aerospace industry exports to embark on an ambitious arms programme. The Iranian Deputy Defense minister claimed that it was part of a peaceful program for launching satellites.[131] In spite of these developments, a number of US intelligence officials state that the reports were politicized by pressure from the policy level to support the NMD program. They claim that Iran still faces problems in its program to build Shahab-3.[132] At least one official has been quoted as stating that, "There is an Iranian threat to US forces in the region, not to the continental United States."[133]Other US officials agree that Iran is considering developing a rocket that can put satellites in orbit, and note that the development of such a booster would give Iran the capability to develop an ICBM.[134]

The timing of a MRBM such as Shahab-3 entails skill, as does effective deployment. It is still unclear when Iran will be able to bring such considerations to the final development stage. It has to carry out a full range of suitable test firings, develop highly lethal warheads and deploy actual units for them. Much still seems to depend on the level of foreign assistance. There have been reports that Iran might be using Russian technology to develop long-range missiles with ranges from 2000 to 6250 kilometers. The Shahab-4, with a range of 2000 kilometers (1250 miles) is said to be based on the SS-4. SS-4 (R-12 or Sandal) is an aging Russian liquid-fuel missile. Besides, in 1998, Iran is reported to have carried out the test of a sea-launched ballistic missile.[135]

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[130] Jane's Defense Weekly, March 22, 2000.
[131] Walpole, op cit. p.4; Text of report in English by Iranian News Agency IRNA, "Iran test-fires anti-armour missile, with high infiltration' capability", 31 July 2001, Reuters.
[132] Cordesman, op cit, 2001, pp.62-64; Karp, op cit.p.9.
[133] Ibid.
[134] Amin Tarzi, "Iran's Missile Test Sends Mixed Messages", Center for Nonproliferation Studies Reports, 15 August 2000, www.crs.miis.edu/pubs/reports/shehab.htm.

2.2 Iran's Weapons of Mass Destruction Capability

2.2.3 Russian-Iranian Relations

The Russian firm, the Russian Central Aerohydrodynamic Institute has provided Iran's Shahid Hemmat Industrial Group (SHIG) with wind tunnels for missile design, equipment for manufacturing missile models, and the software for testing launch and reentry performance. Rosvoorouzheine, a major Russian arms-export agency; NPO Trud, a rocket motor manufacturer; a leading research center called the Bauman Institute, and Polyus (Northstar), a major laser test and manufacturing equipment firm are also reported to be involved in transactions with Iran.[136]

They could play a major role in helping Iran develop longe-range versions of SCUD B and C, and more accurate variations of a missile similar to the No Dong. The Israeli press reported in August 1997 that Israel had evidence that Iran was receiving Russian support. In September 1997 Israel leaked such evidence indicating private and state-owned Russian firms provided gyroscopes, electronic components, wind tunnels, guidance and propulsion systems, and the components needed to build such systems to Iran. It is noted that President Yeltsin, although initially denied such charges, later agreed that head of the Russian space program should examine the US intelligence and draft a report on Russian transfers to Iran. This report reached a very different conclusion that Russia provided such aid to Iran. Iranians were also found to be studying rocket engineering at the Baltic State University in St. Petersburg and the Bauman State University.[137]

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[135] Cordesman, op. cit, 2001, p.58.
[136] Oksana Antonenko, "Russia's Military Involvement in the Middle East", Middle East Review of International Affairs", Vol.5, No.1, March 2001, pp.12-13.
[137] Cordesman, op. cit. pp.60-63.

The Russian Scientific and Production Center INOR concluded an agreement in September 1997 to sell Iran 620 kg. of special alloy called 21 HKMT, and provide Iran with the capability to thermally treat the alloy for missile bodies. INOR was also selling alloy foils in sheets 0.2-0.4 millimetres thick for the outer body of missiles. INOR had also brokered deals with the Shahid Hemmat Industrial Group in Iran to supply steel for missile cases, composite graphite-tungsten materials, laser equipment, and special mirrors used in missile tests. In 1998, the US made an indirect threat that the Congress might apply sanctions. There had been high-level talks, and end result was an agreement by then-Vice President Gore and then-President Chernomyrdin to strengthen controls over transfer technology. It is now not clear whether it put an end to the problem. After the agreement, in 1998 the State Department declared 20 Russian agencies and research facilities were enlisted because of their role in transferring missile technology to Iran. Same year saw new arrests of smugglers attempting to ship 22 tons of specialized steel to Iran via Azerbaijan using Russian corporations as a cover.[138]

Reports on Chinese transfers of ballistic missile technology provide less detail. Iran placed orders for Chinese-made M-9 (CSS-6 / DF-15) missile which is of 280-620 km. range. Chinese firms are likely to give assistance in developing indigenous missile R&D and production facilities for the production of an Iranian solid fueled missile. Iran possibly has acquired much of the technology essential to build long-range cruise missile systems from China. Cruise missiles cost only 10% to 25% as much as ballistic missiles of similar range; HY-2 and Seersucker and CS-802 can be modified quickly for land attacks against area targets. Some reports indicate that China is helping Iran build copies

[138] Ibid.

of the Chinese CS-801/CS-802 and the Chinese FL-2 or F-7 anti-ship cruise missiles.[139] As a result, Iran may be seeking anti-ship capabilities in addition to platforms for delivering WMD. Aircraft or ships could launch cruise missiles with chemical or biological warheads from outside the normal defense perimeter of the Southern Gulf states. Building an entire cruise missile would be difficult. The technology for fusing CBW and cluster warheads is said to be within Iran's grasp, but navigation systems and jet engines are argued to be still a problem.[140] Complex inertial navigation systems (INS), global positioning systems (GPS), or radar altimeters are not easy systems to build. There are commercially available gas turbine engines necessary for use in a cruise missile. Still, it is difficult to find a reliable and efficient turbofan engine for a specific design application. There are over 20 countries with the necessary design and manufacturing skills.

The CIA reported in January 1999 that entities in Russia and China continue to supply missile-related goods and technology to Iran.[141] Tehran is probably using these goods and technologies to achieve its aim of becoming a self-sufficient producer. Shahab-3 MRBM demonstrates the success it has been achieving in realising that goal. Iran is already producing Scud SRBMs with North Korean help and has begun production of the Shahab-3, and is working on the development of the Shahab-4 ballistic missile with a longer range.[142]

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[139] Karp, op. cit. pp.15-16.
[140] Ibid. p. 7
[141] Robert Walpole, "The Iranian Ballistic Missile and WMD Threat Through 2015", Statement for the Record to the International Security, Proliferation and Federal Services Subcommittee of the Senate Governmental Affairs Committee, September 21,2000, pp.3-4.
[142] Charles J. Logan, "Engaging Iran: Options for the New Administration", Strategic Review, Winter, pp.36-37.

Apart from China and Russia, North Korea is a significant supplier to the Middle East and to Iran in particular. Throughout the second half of 1999, North Korea continued to export many ballistic missile-related equipments and missile components, materials and technical expertise. Exports of ballistic missiles and related technology are one of North's Korea's major sources of hard currency, which fuel continued missile development and production.[143]

2.2 Iran's Weapons of Mass Destruction Capability

2.2.4 Iran's Chemical Weapons Development Program

Iran has acceded to the Chemical Weapons Convention (CWC) and acknowledged the existence of a past chemical weapons program. It admitted developing a CW program during the latter stages of Iran-Iraq war as a deterrent against Iraq's use of chemical agents against Iran.[144]Iran developed the capability to produce enough lethal agents to load its own weapons. It produced blood agents like hydrogen cyanide, phosgene gas, and chlorine gas. Blister agents (sulfur mustard) were among the agents that were loaded into bombs and artillery shells and were used occasionally against Iraq in 1987.[145] It is argued that because the Western world just watched what Iraqis did during the First Gulf War, Iran regarded CW as poor man's atomic bombs. In late 1988, Rafsanjani described CW as: "Chemical and biological weapons are poor man's atomic bombs and can easily be produced. We should at least consider them for our defense. Although the use of such weapons is inhuman, the war taught us that international laws

[143] Anthony Cordesman, Transnational Threats from the Middle East: Crying Wolf or Crying Havoc?, CSIS Online Source, May 31,1999, pp. 95-98. www.csis.org.
[144] Peter Herby, The Chemical Weapons Convention and Arms Control in the Middle East, Oslo: Falch Hurtigtrykk, 1992, pp.23-27.

are only scraps of paper". [146]Though CW production estimates are uncertain, production of nerve gas weapons are guessed to get started no later than 1994. Furthermore, weapons include bombs and artillery. It may have developmental chemical warheads for its Scuds. It might have deployed chemical weapons on some of its ships. Iran reportedly placed several orders from China. Razak Industries in Tehran, and chemical and pharmaceutical industries in Tabriz ordered 49 metric tons of alkyl dimethylamine and 17 tons of sodium sulfide, chemicals used in making mustard gas. The orders were never delivered.[147] Iran's International Movalled Industries Corporation (Imaco) and China's North Chemical Industries Co. (Nocinco) brokered them. Both Imaco and Nocinco have been involved transactions affecting Iran's chemical weapons program since 1995. Nocinco has supplied Iran with several hundred tons of carbon disulfide, a chemical used in nerve gas. According to (Directorate of Central Intelligence) DCI Non-proliferation Center reports of February 2000 Iran has already manufactured and stockpiled chemical weapons including blister, blood and choking agents and the bombs and artillery shells for delivering them.[148] Cordesman underscores the role of Western countries as important sources for WMD-related goods and materials; spare parts for dual-use equipment, scientific equipment, and special metals were the most common items sought.[149]

2.2 Iran's Weapons of Mass Destruction Capability

2.2.5 Iran's Biological Weapons Development Program

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[145] Javed Ali, op. cit.p.50

[146] Kenneth R. Timmerman, "Unlimited Offense: Iran's Response to the Missile Threat", The Iran Brief-Policy, Trade & Strategic Affairs, February 23, 1999, p.3.

[147] Ibid.

[148] Joseph Cirincione, "Assessing the Ballistic Missile Threat", Carneige Endowment for International Peace-Nonproliferation Project, February 9, 2000, pp.6-7, www.ceip.org / files /Publications/SenateTestimony.

Iran has a growing biotechnology industry, significant pharmaceutical experience and an infrastructure to support its biological warfare program.[150] Outside assistance is crucial for Tehran and difficult to bar because of the dual-use nature of the materials and equipment pursued by Iran. These materials have many legitimate end uses for the civilian sectors. Iran's biological warfare program began during the Iran-Iraq war, and Tehran, as a nation labeled as a rogue state, is believed to be pursuing offensive biological weapons. It is estimated that it is beyond the R&D stage, producing small quantities of agent. Iran has ratified BTWC. Tehran's weapons effort was first documented in 1982. Having imported suitable types of cultures from Europe, it was working on the production of mycotoxins.[151] In 1989, it was trying to obtain new strains of fungus from Canada and Netherlands that can be used to produce mycotoxins. German sources indicated that they purchased such cultures several years earlier.[152] The Imam Reza Medical Center at Mashdad Medical Sciences University and the Iranian Research Organization for Science and Technology are under suspect. Since the Iran-Iraq War, Iran has conducted research on lethal agents like anthrax, hoof and mouth disease and biotoxins. Iranian groups have periodically approached European firms for the provision of equipment and technology needed for such agents. The CIA Report 2000 report underlines the possible limited capability of Iran for BW deployment.[153] Russian entities

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[149] Cordesman, Transnational Threats from the Middle East, 1999, p.102.
[150] Alexander Pikayev, "The Business of Russian Cooperation with Iran", The Monitor, Winter 2001, pp.5-7. Also available at www.ceip.org/npp
[151] Anthony Cordesman, The Gulf and Transition-US Policy Ten Years After the Gulf War: The Challenge of Iran, Washington D.C.: CSIS Publication, 2000, www.csis.org, pp.42-44.
[152] Cordesman, op. cit. 2001, p.64.
[153] CIA, August 10 2000, Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, 1999 Internet Edition, www.cia.gov.

remain a significant source of biotechnology and chemicals for Tehran. As a consequence of all, it is likely to conclude that Iran has some capacity of deployment of a few agents.

2.2 Iran's Weapons of Mass Destruction Capability

2.2.6 Iran's Nuclear Weapons Development Program

Iran's nuclear history goes back to the Shah's period. The Shah established the Atomic Energy Organization of Iran in 1974, and began to negotiate for nuclear power plants. He concluded an extendible ten-year nuclear fuel contract with the US in 1974, with Germany in 1976, and France in 1977. In 1975, he purchased a 10% share in a Eurodif uranium enrichment in France that was part of a French, Belgian, Spanish and Italian consortium. He created an ambitious plan calling for a network of 23 power reactors throughout Iran that was to be operating by the mid-1990s, and sought to buy nuclear power plants from Germany and France. By the time the Shah fell in January 1979, he had six reactors under contract. Two 1,300-megawatt German nuclear power plants at Bushehr were already 60% and 75% completed. US experts believed Shah began a low-level nuclear weapons research program including weapon designs and plutonium recovery from spent reactor fuel. Iran also tried to purchase 26.2 kg. of HEU, the application to the US was pending when the Shah fell. The program also included a laser enrichment program, which began in 1975 leading to an illegal effort to acquire laser separation technology from the US.[154]

In 1976 Iran signed a secret contract to buy $70 million worth of yellow cake from South Africa and appears to have reached an agreement to buy 1,000 metric tons a year. It is unclear how much of this ore South Africa shipped before it agreed to adopt

IAEA export restrictions in 1984.[155] Before his death the Shah accepted full IAEA safeguards. In 1984, Khomeini revived nuclear weapons program begun under the Shah. Iran received remarkable West German and Argentine corporate support with regard to nuclear technology during the Iran-Iraq War. Possible limited transfers of centrifuge and other weapons related technology took place from China and possibly Pakistan. Iran has a Chinese-supplied heavy water, zero-power research reactor at Isfahan Nuclear Research Center, and two-Chinese supplied sub-critical assemblies, a light water reactor and graphite design facility. It has stockpiles of uranium and mines in Yazd area. It is suspected to have had a uranium-ore concentration facility at the University of Tehran. When it tried to complete Bushehr I and II located in on the Gulf Coast, (southwest of Isfahan) with the German and Argentine support, Iraqis damaged the reactors by air strikes in 1987 and 1988. Iran may have begun to exploit yellow case stocks that the Shah obtained from South Africa in the late 1970s.It is stated that the Khomeini government may have obtained several thousands pounds of uranium dioxide from Argentina by purchasing it through Algeria. Uranium dioxide is considerably more refined than yellow cake, and is easier to use in irradiating material in a reactor to produce plutonium.[156]

The status of Iran's nuclear program since the Iran-Iraq War is highly controversial, and Iran denies the existence of such a program. However, Iran's Deputy President Ayatollah Mohajerani stated in October 1991 that Iran should work with other Islamic states to create an Islamic bomb[157]. Rafsanjani when asked if Iran had a nuclear weapons program in an interview in the CBS program 60 minutes in 1997, replied,

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[154] Cordesman, WMD in the Middle East, p.68.
[155] Jane's Intelligence Review, September, 1997, pp.409-411.
[156] Cordesman, WMD in the Middle East, p.69
[157] Ibid, p.70.

"Definitely not. I hate this weapon." Other senior leaders including President Khatami and foreign minister Kamal Kharrazi stated on October 5,1997 that they are not developing an atomic bomb, because they do not believe it. The only reason for, they state, pursuing nuclear technology is to have an energy source other than their oil and gas reserves. They argue that like US, Iran can also have civilian nuclear energy programs in case their energy reserves of oil and gas will finish in a few decades. They assert that nuclear technology has peaceful purposes, utilities in medicine and agriculture.[158]

The IAEA reports that Iran has fully complied with its present requirements, and that it has not found indications of any nuclear weapons effort, but IAEA only inspects Iran's small research reactors. It is asserted that the IAEA visits to other Iranian sites are not inspections.[159] They do not use instruments or cameras, but just walk-throughs. IAEA visited five suspect Iranian sites in 1992 and 1993 in this manner, but did not conduct full inspections.[160] Iran has not had any 93+2 inspections and their position seems diplomatical, that they will not be either the first or the last to have them. Iran attempted to buy highly enriched (HEU) uranium from Kazakhstan. The US bought the huge amount-1,300 pounds HEU that Iran desired-from Ust-Kamenogorsk facility in Kazakhstan. Iran has also imported maraging steel, used for centrifuges, by smuggling it through dummy fronts.

In May 1987, Argentina agreed to train Iranian technicians at its Jose Balaseiro Nuclear Institute, and sold Iran $5.5 million worth of uranium for its Amirabad Nuclear Research Center reactor. Argentina agreed to provide Iran with HEU and possibly uranium enrichment and plutonium reprocessing technology as well. Change in

[158] Ibid.
[159] Michael A. Ottenberg, "Israel and the Atom", American Sentinel, August 16, 1992, p.3.

government in 1992 cancelled the $18 million nuclear technology sale to Iran putting fore the reason that Iran had not signed a nuclear safeguards arrangement. Argentine press sources suggested, however, Argentina was reacting to US pressure.[161]

Spanish, German and Czech help was sought by Iran so as to complete the two power plants at Bushehr. Associated Enterprises of Spain and another two ENUSA and Kraftwerke Union were involved in negotiations. A 10-man delegation from Iran's Ministry of Industry was in Madrid negotiating with the Director of Associated Enterprises, Adolofo Garcia Rodriguez. These negotiations occurred in late 1980s and early 1990s.[162] It is reasonable to argue that Iran intensified its efforts to develop a nuclear weapons program after the lessons of the Gulf War. It was obvious after the Gulf Wars that missiles and WMD may well be used in the future, either to attack or as a response to attempts at intimidating.

Iran reportedly tried to import reactor parts from Siemens in Germany and Skoda in Czechoslovakia.[163] None of these efforts solved Iran's problems in rebuilding its reactor program, but all these demonstrate the depth of its interest. In 1992, Iran attempted to buy beryllium from a storage site in Kazakhstan that had also 600 kg. of HEU. Later on, in 1994, the US bought the material getting it out of the country. In July 1996 British customs officials seized 110 pounds of maraging steel being shipped to Iran.[164]

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[160] Ibid.
[161] Philadelphia Inquirer, Nov.1, 1998, p.A-6, Online Database Ebscohost.
[162] Shahram Chubin, "Iran's Strategic Predicament", Middle East Journal, Vol. 54, No.1, Winter 2000, pp.13-14.
[163] Cordesman, WMD in the Middle East, p.74.
[164] Ibid.

Iran continues to operate an Argentine-fueled five-megawatt light water HEU reactor at the University of Tehran. It may be useful in experimenting with nuclear weapons designs. The Center has experimented with a heavy water zero-power reactor, a light water sub-critical reactor, and a graphite sub-critical reactor. Experts state that with the Iranian present reactors, although they are scarcely ideal for irradiating material to produce plutonium, Iran has the technology base to make its own reactors.[165] Russia has agreed to build up four reactors, beginning with a complex at Bushehr, with two 1,000-1,200 megawatt reactors and two 465-megawatt reactors, and thereby pledging considerable nuclear technology and expertise. Russian Federation was about to sell a centrifuge plant to Iran in April 1995. It was curtailed only by the US endeavors at the presidential level. What's more another possible supplier is Ukraine. The US persuaded Ukraine not to sell Iran $45 million worth of turbines for its nuclear plant in early March 1998 and to strengthen its controls on Ukrainian missile technology under the MTCR.[166]

Seemingly there is an urgent need to better the monitoring of Russian, Ukrainian Western and newly independent states' contacts to Iran. With respect to Iran's nuclear infrastructure, these states', and especially Russian assistance can enhance Iran's ability to sustain a nuclear weapons development effort. The control of fissile material in the former Soviet Union territories remains a vital problem for the nonproliferation regime. Soviet Russia left a nuclear legacy of some 1,485 tons of fissile material. These include 770 tons in some 27,000 weapons, including 816 strategic bombs, 5434 missile warheads, and about 20,000 theater and tactical weapons. In addition to that, there large numbers of

[165] Bill Gertz, "Russia, China Aid Iran's Missile Program", Washington Times, September 1997; "Iran Special Weapons Facilities", Federation of American Scientists, 10/10/97.
[166] Shahram Chubin, "Does Iran Want Nuclear Weapons? " , Survival, , Vol.37, No.1, Spring 1995, pp.98-100.

experienced technicians in the Russian weapons design center at Arzamas, and in nuclear production complexes in Chelyabinsk, Krasnoyarsk and Tomsk.[167]

The CIA warned in January 2000 that Russia might have sold Iran heavy water and graphite technology. The Jerusalem Post, on April 9, 1998 reported that Iran had purchased four tactical nuclear weapons from Russian smugglers for $25 million in the early 1990s, that the weapons were obtained from Kazakhstan in 1991, and that Argentine technicians were helping to activate the weapon.[168]

In early 1990s, China was reported to have agreed to provide significant nuclear technology transfer and possible sale of two 300 megawatt pressurized water reactors. It reportedly gave up such endeavors after pressure from the U.S. On November 4, 1991, China stated that it had signed commercial cooperation agreements with Iran, and that it would transfer an electromagnetic isotope separator (calutron) and a small nuclear reactor, for peaceful and commercial purposes. These had no value in producing fissile material, but gave Iran knowledge of reactor and enrichment technology, and China may have provided Iran with data on chemical separation, other enrichment technology, the design for facilities to convert uranium hexaflouride to make reactor fuel and help in processing yellow cake. China pledged in October 1997 not to engage in any new nuclear cooperation with Iran.[169] The pledge appears to be holding according to the analysts and certain intelligence services. As a party to the NPT, Iran is required to apply IAEA safeguards to nuclear fuel, but safeguards are not required for the zirconium plant or its

[167] Jeanette Wolf, "Iran's Nuclear Procurement Program: How Close to the Bomb? ", The Nonproliferation Review, Fall 1997, pp.125-37.
[168] Ibid.
[169] Michael Eisenstadt, "Déjà vu All Over Again? An Assessment of Iran's Military Buildup" in Patrick Clawson (ed.) Iran's Strategic Intentions and Capabilities, Washington: National Defense University, 1994, pp.106-108.

products. In March, the US found that China Nuclear Energy Corporation was negotiating to sell Iran several hundred tons of anhydrous hydrogen fluoride (AHF) to Isfahan Nuclear Research Corporation in central Iran, a site where some experts believe Iran is working on the development of nuclear weapons.[170] AHF can be used to separate plutonium, help refine yellow cake into uranium hexaflouride to produce U-235, and as a feedstock for sarin. Chinese authorities are said to have provided a variety of missile-related items and assistance to several countries of proliferation concern. One of the allegations is that China continued to work on one of its remaining projects, supplying Iran's civil nuclear program with a zirconium production facility. This facility can be used to produce cladding for reactor fuel, and IAEA safeguards do not comprise the zirconium plant and its products.

There are two important points in considering Iran's attempts at acquiring nuclear military capability. First, the construction of a 1,000 megawatt nuclear power reactor in Bushehr. This project will help Iran augment its nuclear technology infrastructure, which in turn will be useful in sustaining nuclear weapons research and development. Second issue evolves around the point that whether Iran can buy fissile material. Timing of weapons acquisition depends heavily on whether it can do so. If it had, it would produce weapons in not more than 2 years. Otherwise, it has to develop the capability to process plutonium or enriched uranium, which means it is likely to take 5-10 years.

The war maintained a balance of power in the region especially visible between Iran and Iraq, the two archenemies. Iran, which was the relatively militarily backward state when compared to Iraq in the late 1980s, now has a stronger military stance vis-à-vis Iraq owing to latter's devastation in the second Gulf War. Its continued missile

[170] Ottenberg, op. cit. p.4

development efforts reinforced Iran's military and political deterrent. Even mere intelligence that it is actively pursuing WMD and missile capabilities enforces strategists and military planners to revise their risk calculus. If we assume that Iran had all the sophistication needed to direct and control NBC weapons and missiles, it would have to choose among several possible delivery options which are use of strike aircraft, saboteurs, unmanned aerial vehicles (UAVs), and ballistic and/or converted cruise missiles for land attack. But, how frightening or big is the threat? The answer entails contemplating three factors: hard technology, soft technology, and vital foreign assistance. Iran today is a world leader in the development of large artillery rockets with ranges of 40 to 200 km. These are not very effective delivery systems, but their technical weakness can be compensated by their low cost and by deploying large numbers or arming them with chemical or biological agents.[171]

Nevertheless, even the largest artillery rockets do not have 'strategic value' despite their splendid 'tactical potential'. It is a concern for Iraq, but not for Turkey. Iran has to master the specifications of solid motors, solid fuels and fuel grains, which require huge chemical and manufacturing finesse. It is pointed out that even the suppliers of Iran (China and Russia) required more than 25 years to master that technology.[172]

Scud development was a good route for Iranian proliferation efforts. The Scud missiles can be reverse engineered for production and easily stretched to ranges of 1,000 km, but experts underline this issue as one of the many enigmas of Iranian rocketry. Iranians always failed to use this Scud production capability. The most likely explanation

[171] Chubin, op. cit, 2000, p.19
[172] Cordesman, op. cit, WMD in the Middle East, p.79.

is that essential manufacturing materials cannot be supplied by any other state such as North Korea or Russia.

With less probability than its ballistic missiles, Iran has been at the forefront of Middle Eastern efforts to develop cruise missiles. However, its efforts are restrained by lack of advanced technology, weak aerodynamic infrastructure and a low funding priority. The Chinese Silkworm and its Russian counterpart the Styx are to cruise missiles what the Scud is to ballistic missiles: cheap, easily reverse-engineered, and well suited to modification and mass production.[173]

Lack of advanced technology appears as the inability to produce and control follow-on systems and guidance systems regarding the cruise efforts. Without massive foreign assistance, it is estimated that Iran will not be able to develop a new generation cruise missile within the next 15 years.[174] A new generation of cruise missiles could overcome the range problem associated with the Scuds, by giving any state weapons effective to ranges of 600 to 800 km. If the enlisted obstacles are eliminated, cruise missiles are advantageous for Iran because of their lower cost, greater accuracy and more effective delivery of chemical and biological warheads. Turning back to the ballistic missiles, Shahab-3 is a domestic Iranian design, but with much foreign assistance to its fuel casting, casing and nozzle fabrication. Neither of the Shahab programs (Shahab-3 or Shahab-4) is being managed like the systemic procurements programs of the US or the

[173] Aaron Karp, "Lessons of Iranian Missile Programs for US Nonproliferation Policy", The Nonproliferation Review, Vol.5, No.3, Spring/Summer 1998, p.4.
[174] Ibid, p.5.

NATO. They appear to be motivated by a general Iranian desire to have long-range ballistic missile.[175]

Many experts evaluate the Shahab development program as a low-risk creating one and do not regard any successful Shahab-4 deployment plausible before eight years time.[176] Even if Iranians solved the propulsion problems, they would experience big problems with the guidance systems. Furthermore, there are warhead problems, which are much harder to overcome. Unless Iranian nuclear program receives massive foreign assistance, including the import of fissile material, Iran must rely on conventional explosives or CBW for many years. Iran probably experiments with chemical warheads for its Scuds, but their effectiveness is difficult to test and unknown until actual use. Another limitation comes with the re-entry vehicles. Unless Iran has a foreign-made system, the range of its MRBMs will be limited to nearly 1,000 to 1,200 km. Greater ranges entail higher re-entry speeds and more developed heating systems which Iran is not capable of creating by itself.[177] As for the ICBMs, there are incredible difficulties such as engine clustering, multiple staging and systems integration. Above all, Iran needs an inertial navigation systems and a highly destructive warhead. Thus, there are great difficulties facing Iran in the realm of hard technology.

As for 'the soft technology', the circumstances are no less discouraging. Soft technology comprises decision-making, management expertise, engineering skills and finance. It is this very realm that blocks and frustrates Iranian authorities' nuclear and missile ambitions. There is a poor decision-making, which is the linchpin of the

[175] Anthony Cordesman, Weapons of Mass Destruction in Iran-Delivery Systems, and Chemical, Biological and Nuclear Programs, CSIS Online Edition, April 28, 1998, pp.8-10.
[176] Justin Anderson, "Background on Test of New Iranian Missile", Ballistic Missile Proliferation in the Middle East Project-Carneige Endowment for International Peace, www.ceip.org/npp.

development programs. Iranian political leaders have been unable to reach to a consensus in channeling the nation's missile projects. Resources are divided between Pasdaran (the Islamic Revolutionary Guards Corps), the Army, and the Ministry of Defense. With numerous missile projects on-going, no single one is likely to get a concentrated effect. According to Aaron Karp, each missile program is the worst enemy of the other. It is when Iran is making a choice between them that Turkey should become alarmed. Even if the technological aid arrives, lack of skilled personnel makes it hard for Iran to absorb that know-how, dual-use materials, missile design and production equipment. It certainly has competent engineers, but human resources are weak, technicians are not skilled at the down-level chain of command.[178]

The final factor in assessing Iranian ballistic missile threat is the foreign assistance. This assistance is governed by political factors that in turn control both Iran's ability to acquire technology and supplier states' ability to give help to its programs. The relationship among China, Russia, to a lesser degree North Korea, and Iran is central to the question of how threatening Iran can become in the future. The focal point of this collusion is the issue of its durability. It seems it will be a long-lasting relationship up until economic prosperity is realized in supplier countries. Attempts at halting the technology transfers to Iran such as those of the US do strain the Iranian missile developments. Iran knows that it will face various sanctions if it won't be following its treaty obligations.[179]

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[177] Karp, op. cit.p.7

[178] Justin Anderson, "Ballistic Missile Arsenals in the Middle East", Middle East Project-Carneige Endowment for International Peace, www.ceip.org/npp.

[179] W. Seth Carus, "Iran As a Military Threat", National Defense University Strategic Forum, No.113, May 1997, http://www.ndu.edu/inss.

Iran has perceived or faced threats from Iraq, the Soviet Union, the United States, and Israel at various times during the Cold War. Now with the exception of Russian Federation, the list endures. Turkey, Afghanistan and Azerbaijan may added to this list. Estimated Iranian threat perception is essential because it shapes the pattern of military build-up and priorities of the Iranian army.

As a result of growing military cooperation with Turkey, Israel now effectively has a presence on the Turkish border with Iran, reportedly operates intelligence collection facilities there and Israeli reconnaissance or strike aircraft could overfly Turkey en route to Iran.[180] Owing to that cooperation and its benefits to Israel, Iranian threat perception has increased regarding Turkey. Besides, Iran sees a revitalized Iraq as the greatest long-term threat to its interests. Another threat coming from the west is the Jewish State. Above all, from the south, US presence through its naval power projection forces in the Gulf disturbs Iran considerably. Turkey is regarded as a new threat to the north emerging in the early 1990s, together with Afghanistan and Pakistan. Moreover, since the Gulf War the US has increased its forward military presence tremendously in the Gulf region. Iran sees this presence as a threat to its territorial integrity and political independence. This also limits its political and military freedom of action in the region. Iran believes that the United States tries to create an anti-Iranian bloc to its north and northeast, while it is encouraging the build up of regional oil and gas pipelines that bypass Iran. Therefore, it regards American encirclement efforts intended to harm its economy, reduce its freedom of action, and diplomatic room for maneuver. Iranian force deployments reflect these threat perceptions. Most of Iran's ground forces are deployed near the border with Iraq.

Most of its air force is deployed toward Iraq and the Persian Gulf region as an indication of their threat perceptions.[181]

Iranian MRBMs still have technical problems in addition to those of soft technology. Yet, Turkish decision-makers intend to pursue a deal for theater missile defense against loose nukes.[182] It is a prudent move on the side of Turkey to consider the future probable role that Iranian medium-range ballistic missiles would play if they could overcome the technological obstacles one day. It is not clear whether Iran can locally produce the rocket motor for the Shahab-3 without particularly Chinese assistance. Still, it is a prudent move for Turkish military experts to plan for scenarios in which Shahabs are ready to be used by Iran. If technical problems defied and mass production is materialized, the Shahab-3 will enable Iran to target Israel, Turkey, and Egypt, and in the event of an Iranian-American encounter, the knowledge that they are within the range of Iranian missiles can influence leaders in Israel or Ankara. Accordingly, Turkish planners have become increasingly interested in obtaining anti-missile defenses.[183]

The Shahab is of negligible value as a conventional weapon, as it is incapable of striking military targets with any precision. The ineffectiveness of ballistic missiles with conventional warheads was demonstrated in the second Gulf War by the Iraqi conventional ones that proved worthless in the strict military sense. The only conceivable value of the Shahab-3 is strategic, the delivery of nuclear, chemical or biological agents

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[180] Dov Waxman, "Turkey and Israel: A New Balance of Power in the Middle East", The Washington Quarterly, Winter 1999, p.29; Michael Eisenstadt, "The Armed Forces of the Islamic Republic of Iran: An Assessment", Middle East Review of International Affairs, Vol.5, No.1, March 2001,p.4.

[181] Charles Kurzman, "Soft on Satan: Challenges for Iranian-US Relations", Middle East Policy, Vol.VI, No.1, June 1998, p.69.

[182] "Defense News: Türkiye Füze Kalkanında İstekli", June 5, 2001, www.ntvmsnbc.com/news. Turkish diplomatic sources indicated that Turkey was eager to have a theater missile defense system in Southeast Anatolia so as to intercept and destroy possible Iraqi and Iranian missiles immediately after launch.

[183] Ibid.

of mass destruction. Iran has well-known chemical and developing biological capabilities, and is believed to be five to ten years away from developing nuclear weapons, largely depending on whether it acquires the necessary components and fissile material abroad or develops them on its own.[184] Arming the Shahab-3 with unconventional warheads is a difficult undertaking. Developing both a reliable nuclear and biological warhead is difficult because of the need to insulate the components from degradation when the missile re-enters the atmosphere. Fitting the Shahab-3 with chemical warheads is much easier, but would require numerous tests.[185]

The use of WMD to obtain leverage in the region may be more significant than the likelihood that these weapons would actually be used. Even their deployment-the threat of their use-is very destabilizing, inspiring serious caution by many Middle Eastern states.

2.3 Syrian Weapons of Mass Destruction Capability

Syria has made considerable progress in acquiring weapons of mass destruction since the mid-1970s. Syria has never shown a series interest in nuclear weapons, though it sought to obtain two small research reactors from China in 1992 and purchased a small 30-kilowatt research reactor from China in 1991. Still, there is no evidence with regard to a nuclear weapons programme. It ratified the NPT on 9/24/69 and has not signed the

[184] The Supplier's Network Datapage-Ballistic Missiles, www.cdiss.org/supply; Barry Rubin, "The Persian Gulf After the Cold War: Old Pattern; New Era", Middle East Review of International Affairs, Vol.3, No.2, June 1999, p.6; Anthony Cordesman, The Gulf and Transition: US Policy Ten Years After the Gulf War: The Challenge of Iran, CSIS Online Edition, October 30, 2000, www.csis.org, Aaron Karp, op. cit. p.9.
[185] Cordesman, op. cit. p.41; Karp op cit. pp.9-11.

CTBT. Syria's 30 kilowatt neutron-source research reactor is unsuitable for weapons production, and it allows inspections by IAEA as seen in February 1992.[186]

2.3 Syrian Weapons of Mass Destruction Capability

2.3.1 Syrian Missile Program

Syria has four surface-to-surface missile brigades, 1 with Frog 7s, 1 with Scud Bs, 1 with Scud Cs, and 1 with SS-21s. It obtained the FROG 7s in 1972 and the Scud B missiles in 1974. However, these missile forces did not play a major role for the Syrian army until Israel's invasion of Lebanon in 1982.[187] Upon recognizing that Israel suppressed Syrian air force and much of its land-based air defenses in Lebanon, Syria perceived missiles as a means of countering Israeli advantage in the air, and as a deterrent to Israeli conventional air attacks. It is estimated that it has 18 SS-21 launchers and at least 36 SS-21 missiles with 80-100 kilometers range for which it may develop chemical warheads.[188] Syria is reported to have up to 12 Scud B launchers and 200 Scud B missiles with 300-310 kilometers range. It is believed to have chemical warheads to be delivered by the Scud missiles.[189]

Syria succeeded in obtaining North Korean deliveries of Scud C missiles. These deliveries are known to be starting on March 13, 1991 via a freighter called the Al-

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[186] Metehan Demir, "Syria Strengthens its Military Amid Uncertain Political Climate", Aviation Week & Space Technology, October, 2000, Vol.152, Issue 15, pp.62-69.
[187] Jane, Garvey, "World News Roundup", Aviation Week & Space Technology, September 2000, Vol.153, Issue 15, pp.20-25.
[188] "Cruise Missiles Becoming Top Proliferation Threat", Aviation Week & Space Technology, January 1993, Vol.138, Issue 5, p.20-22; Ali Murat Köknar, "Threats from Above", Armed Forces Journal International, Jan 2000, Vol.137, Issue 6, p.12-16. He also reports on the steps taken by Turkey in reaction to the improving ballistic missile capability of hostile neighboring countries, Syria's deployment of cruise and Scud missiles and Turkish defensive measures taken.
[189] M.A. Heller, Coping with missile proliferation in the Middle East", Orbis, Winter 1991, Vol.35, Issue 1, p.12.

Yarmouk. The North Korean freighter Dae Hung Ho is claimed to be involved in these shipments.

Approximately 50-80 Scud C missiles and 15-20 launchers have been delivered and manufactured since 1991, and it is maintained that several Syrian tests of the missile took place.[190] These missiles give Syria the ability to hit targets within a range of 500-600 kilometers with a payload of 450-600 kilograms. According to Anthony Cordesman, Syria has built two missile plants near Hama, about 110 miles north of Damascus. [191]One is for solid fueled systems, and the other is for liquid fueled systems. It is controversial whether Syria can produce Scud Cs, but it is believed that North Korea may provide the necessary equipment for the liquid fuel plant.

Syria sought also for M-9 missiles from China. Although Syria denies that, it is believed to meet many Syrian needs due to its range.[192] It has a range in excess of 600 kilometers. There are also reports that China sold Syria the M-1B missiles with ranges of 50 to 60 miles, in 1990. Several sources points out that Syria is developing indigenous production capability for M-9 missiles. It has also a stockpile of cruise missiles and unmanned aerial vehicles (UAV).[193] SS-N-36 Sepal with 450 km. range and 1,000 kg. payload, together with SS-N-20 Styx with 80 km. range and 513 kg. payload comprise Syria's cruise missile force. Syria possesses Tupolev and Malachite UAVs with ranges of 360 km. and 120 kms respectively. Besides, Syria has other means of delivery for WMD. It has shorter-range systems and strike fighters. Its inventory involves short range M-1B missiles with a range of 60 miles, 20 SU-20 ground attack aircraft 20 Su-24 long range

[190] "Syria Tests Scud C SRBM" , August 19, 1996, www.cdiss.org/bak_1.htm
[191] Anthony Cordesman, Weapons of Mass Destruction in the Middle East-Regional Trends, National Forces, Warfighting Capabilities, Delivery Options and Weapons Effects, CSIS Publication, pp.36-42.
[192] "Anything You Can Do…", Economist, Vol.343, Issue 8016, October 1997, p.36.

strike fighters, 30-60 operational MiG-23BM Flogger F fighter ground attack aircraft and multiple rocket launchers and tube artillery. Furthermore, Syria reportedly has improved its targeting capability in recent years by making use of commercial satellite imagery, much of which offers 3 meter levels of resolution.[194]

2.3 Syrian Weapons of Mass Destruction Capability

2.3.2 Syrian Chemical Weapons Capability

Syrian troops probably began their WMD training after 1982, and Syria began to give chemical warfare a priority. This priority seems to be consequent upon the Syrian perception that it needs WMD as a way of maintaining its status relative to its regional military rivals as is the case with missiles. Experts indicate that Syria begun manufacturing and deploying non-persistent nerve and other gases in 1982 or 1983. By the late 1980s, Syria seems to have been operating two to three facilities for production of CW. [195]One seems to be the Center d'Etdues et de Recherche Scientifique (CERS) that also possibly plays a role in the production of bioagents, another is near Homs, a third is near Saffirah, a village near Allepo.

Syria first acquired small amounts of chemical weapons from Egypt in 1973. As noted, it began producing in 1982, and it is estimated to have started deploying chemical warheads for missiles in 1985.[196] Military analysts believe it stockpiled 500 to 1,000 metric tons of chemical agents. These include non-persistent nerve gases like Sarin and persistent nerve gas agents like VX. It is believed to have begun deploying VX, -a highly

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[193] Cordesman, op cit. p.38.
[194] Al J Venter, "Syria's Nuclear Alternative", Middle East, Issue 307, December 2000, pp.12-14.
[195] "Syria's Chemical Weapons", www.cdiss.org/96sept1.htm

lethal chemical agent-in 1997.[197] It is argued that VX is being produced at a plant near Damascus. Syrians were caught smuggling feedstocks from Russia in 1993 and 1994. It obtained 1,800 pounds of feedstocks for nerve gas in 1993, and smuggled out another 11,000 pounds in 1994.[198]

As for the delivery systems and weapons, Syria is reported to have modified a variant of the Soviet ZAB series incendiary bomb to deliver chemical agents. It is estimated that it may have modified the PTAB-500 cluster bomb to carry chemical bomblets. Most probably, Syria have developed chemical artillery shells, and may be working on chemical munitions (chemical rounds) for its multiple rocket launchers.[199] Syrian Frog missiles may have been given priority and Frog warheads may be under development. Above all, focal point of Syrian chemical program seems to have been strategic. It is asserted that Syria modified its Scud missiles to deliver chemical weapons no later than 1987.[200] A number of analysts argue that Syrian surface-to-surface missiles armed with chemical weapons were stored in the mountains near Damascus and in the Palmyra region.[201] Putting chemical warheads on the Scud missiles gives Syria an effective system. Assuming a burst altitude of 1,100 meters, and a ground wind speed of three feet per second, optimal delivery conditions, the warhead could produce a contaminated area that would cover a band about 0,53 km. wide and 3.5 km. long. That assumes 50% of the exposed personnel would be casualties. This is a very impressive

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[196] "Syria, Most Advanced in Arab World in Chemical Weapons", Ma'ariv, August 8,1996 [EBSCO Online].
[197] "US Informs Bonn of Syrian Toxic Gas Unit", The Washington Times, June 5,1996.
[198] "Increased Syrian Threat of Non-Conventional Warfare", IINS News Service, 3 September, 1997; "Israel: Syria Prepares Missiles", Associated Press, June 24,1997.
[199] Syria-special Weapons Federation of American Scientists, www.fas.org/nuke/guide/syria/index.html
[200] Uzi Mahnaimi, "Syria builds nerve gas arsenal", Sunday Times, 17 November,1996.
[201] Cordesman, op. cit. p. 40.

lethality. If VX nerve agent is used, then the lethality remains for several days.[202] Syrian Centre d'Etudes et de Recherche Scientifique (CERS) seems to manufacture bomblets that can be loaded into either Scud B or Scud C warheads and bombs, and which could be modified to disperse biological weapons.

2.3 Syrian Weapons of Mass Destruction Capability

2.3.3 Syrian Biological Weapons Capability

Syrian Defense Minister, General Mustafa Tlas has written an article on biological warfare that was published in Iran. He gives many details with regard to biological warfare's history, the concept of biowarfare, methods of exploitation, range and effectiveness of bioagents, prevention against biological agents and usage and application of a biological weapon in war. [203]This is particularly significant because the author is the defense minister of Syria.

Syria signed, but did not ratify the 1972 Biological and Toxin Weapons Convention (BTWC). There are reports of one underground facility and one near the coast. Analysts point to the dual-use sites including a pharmaceuticals plant in Aleppo which was left unfinished in 1989. These plants are widely distributed throughout the country and Syria may tap the potential of more than a dozen government-run pharmaceuticals plants, which could be converted rapidly to produce a wide variety of chemical and biological agents. Syria's suppliers of CBW production technology and equipment were chemical brokerage houses in Holland, Switzerland, France, Austria and

[202] "Syria Close to Producing Nerve Gas", Israeli Line, Wednesday, June 24, 1998.
[203] Cordesman, op. cit.p.41.

Germany, including many of the companies that were supplying Iraq.[204] According to Israeli sources, Syria was able to produce botulin and ricin toxins in 1991 using the mentioned channels and plants. It is estimated to have production capability for anthrax and botulism. Military experts state that although it is difficult to design adequate missile warheads to disseminate advanced agents such as anthrax, this is not beyond Syrian capabilities.[205] It is argued that much of the technology needed to make effective cluster munitions and bomblets for VX gas can be adapted to the delivery of biological weapons. [206]Older types of biological weapons using wet agents, and placed in older bomb and warhead designs with limited dissemination capability is argued to achieve only a small fraction of the potential effectiveness of dry agents in weapons with excellent dissemination capability. Dry micropowders using advanced agents can have the effectiveness of small theater nuclear weapons. Biological weapons can be tailored to produce prompt or delayed kills, and different agents can be mixed to produce highly complicated effects that are very difficult to detect, characterize and treat.[207]

2.4 Egypt's Weapons of Mass Destruction Capability

Egypt is one of the countries of proliferation concern in the Middle East. Because of its size, resources, conventional capabilities and the population, Egypt deserves no less attention than other Middle Eastern states. Egypt began three design programs based on

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[204] Nicholas Horrock, "The New Terror Fear: Biological Weapons", US News & World Report, Vol.122, Issue 18, 1997, p.36.
[205] "Stop The World, I Want to Get Off", Economist, Vol.360 Issue 8232, p.35; Cordesman, op cit.p.42; Naomi Freundlich," Countering 'the poor man's nuclear weapons' ", Business Week, Issue 3506, December 1996, pp.122-128; W. Seth Carus, "Biological Warfare Threats in Perspective", paper presented at the Brookings Institution on April 27,1998, www.brook.edu/fp/events.
[206] "Israeli envoy says North Korea delivering chemical, biological arms to Syria", BBC Monitoring Service, 29 August 1997.

the V-2 missile in the 1950s with help from German scientists. By 1965, it tested two missiles, namely al-Zafir and al-Kahir, with ranges of 350 km and 600 km. respectively.[208] These developmental efforts ceased around 1967. It cooperated with Iraq in paying for the development and production of 'Badar 2000' missile with a 750-1,000 km. range. This missile is reported to be a version of the Argentine Condor II or Vector missile. Egypt began collaborating with Argentina in 1984 on the Badar 2000 missile, but this came to an end when US officials uncovered the endeavor.[209]

Egypt has Scud B launchers and approximately 100 missiles with 300 km. range. There are reports indicating that it has worked on an improved version of the Scud B and Scud C with North Korean cooperation. This new variant's range is believed to be 500 km. Another liquid-fueled missile under development is stated as 'Project T', with an range of 450 km.[210] In June 1999, CIA reported that Egypt had acquired Scud B parts from Russia and North Korea during 1996.[211] Still, same CIA report underscores continuing Egyptian efforts to develop and produce the Scud B and Scud C and develop the two-stage 'Vector' short-range ballistic missiles (SRBMs). Cairo is also reported to be interested in developing a medium-range ballistic missile (MRBM) as Iran has.[212] Three Egyptian companies are sanctioned by the US for transferring US-based technology to North Korea, which is on the MTCR forbidden transfer list.

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[207] Leonard A. Cole, "The Specter of Biological Weapons", Scientific American Online Edition, 1995, www. sciam.com/1269issue/1296cole.html.
[208] "The Arms Trade" Scientific American, 2000, www.sciam.com; US Arms Control and Disarmament Agency Reports on Controlling Missiles and Space Weapons, http:/dosfan.lib.uic.edu/acda/reports
[209] Anthony Cordesman, WMD in the Middle East, CSIS Online Publication, pp.20-22, www.csis.org/stratassessment/reports.
[210] Ibid.
[211] CIA, "Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, 1 July through 31 December 1999" Internet Edition, August 10, 2000.
[212] Ibid.

Egypt has other potential delivery systems in addition to ballistic missiles. F-4E fighter ground attack aircraft, Mirage 5E2 fighter ground attack aircraft Mirage 2000EM fighters and F16A and 80 F16C fighters, along with multiple rocket launchers and tube artillery constitute a huge inventory of delivery means. Furthermore, it has AS-15, SS-N-2 and CSS-N-1 cruise missiles.

2.4 Egypt's Weapons of Mass Destruction Capability

2.4.1 Egypt's Chemical Weapons Capability

Egyptian chemical weapons procurement program has begun under Gamel Abdel Nasser's control. Egypt, which is not a signatory of the Chemical Weapons Convention (CWC), is known to have produced and used mustard gas in Yemeni civil war in 1963-1967.[213] However, it is reported that agents-used may have been stocks British abandoned in Egypt after World War II.[214] It is argued that Egypt completed research and designs for production of nerve and cyanide gas before 1973.[215] It supplied Syria with chemical weapons in early 1970s, and Iraq with CW agents and technology during the 1980s. Former Egyptian Minister of War, General Abdel Ranny Gamassay's statement made in 1975, reinforces the estimates that Egypt has several production facilities chemical agents such as mustard and nerve gas are plausible. He stated that, "if Israel should decide to use a nuclear weapon in the battlefield, we shall use the weapons of mass destruction that are at our disposal." Center for Nonproliferation Studies (CNS) points out that Egypt may have limited stocks of bombs, rockets, and shells, and that there are unconfirmed

[213] Center for Nonproliferation Studies-Monterey Institute of International Studies-Middle East/Africa, http://www.cns.miis.edu/research/wmdme/egypt.htm.
[214] Peter Herby, The Chemical Weapons Convention and Arms Control in the Middle East, Oslo: Falch Hurtigtrykk, 1992, pp.23-30.

reports of recent efforts to acquire feed stocks for nerve gas.[216] It is stated also that it has a stockpile of chemical agents (mustard and nerve agents). Furthermore, there are estimates in that Egyptian industrial infrastructure present for rapid production of cyanide gas.[217]

2.4 Egypt's Weapons of Mass Destruction Capability

2.4.2 Egypt's Biological Weapons Capability

There is no evidence of major organized biological research activity. It may have a biological weapons program, though not large in scale.[218] Egypt signed the BTWC on 4/10/72, but has not ratified it. It is reported that Egypt's biological warfare efforts may include work on plague, botulism toxin and the encephalitis virus. Other research is said to include anthrax, rift valley fever, and mycotoxicosis.[219] The extent of weaponization of any of these agents is unknown, but it is maintained that extensive domestic Egyptian armaments industry is probably capable of devising a variety of suitable delivery systems.[220] In 1970, the president of Egypt Anwar al-Sadat was reported to have stated that "Egypt has biological weapons stored in refrigerators and could use them against Israel's crowded population." Al-Sadat's declaration was interpreted as an intention to warn Israel against a nuclear strike, and Israel did in fact contemplate the use of nuclear weapons in the Yom Kippur War in 1973.

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[215] Cordesman, op cit.p.22.
[216] Federation of American Scientists WMD Profiles-Egypt, www.fas.org/asmp/profiles/egypt.htm
[217] Ibid
[218] The report on WMD, October 4, 1999 www.csis.org/stratassessment/reports/WMD.html
[219] Nuclear, Biological, Chemical, and Missile capabilities in the Middle East, Egypt http://www.cns.miis.edu/ research/wmdme/egypt.htm
[220] Egyptian Biological Weapons Program, http://www.fas.org/nuke/guide/egypt/bw; Dany Shaham, "The Evolution of Chemical and Biological Weapons in Egypt", Ariel Center for Policy Research, http://www.acps.org.il/publications/arab-attitude/pp46-xs.html.

2.4 Egypt's Weapons of Mass Destruction Capability

2.4.3 Egypt's Nuclear Weapons Development Program

The Egyptian nuclear program was launched in 1954. Egypt acquired its first nuclear reactor from the Soviet Union in 1961.[221] President Gamal Abdel-Nasser at Inchass -in the Nile Delta- opened the two-megawatt reactor. After the 1967 defeat at the war with Israel the Egyptians gave up their nuclear procurement effort. Seemingly, Egypt has decided to concentrate on increasing conventional forces, and chemical and biological weapons, rather than developing nuclear weapons ever after. However, at the same time, serious work on developing nuclear potential designated for use in power engineering, agriculture, medicine, biotechnology, and genetics continued.[222] It is declared that industrial incorporation of four explored uranium deposits was planned, including the extraction and enrichment of uranium for subsequent use as fuel for atomic power plants. Egypt tried to cooperate with the US in the mid-1970s, and the US promised to provide Egypt with eight nuclear power plants and the necessary cooperation agreements were signed.[223] In the late 1970s, the US unilaterally revised the bilateral agreements and introduced new conditions that were unacceptable to the Egyptian government. It appears that the decision to ratify the NPT was taken with one goal in mind: the implementation of a nuclear power program. Egypt acceded to the NPT in 1981, and signed the Comprehensive Test Ban Treaty (CTBT) in 1996. Before his

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[221] "The Nuclear Potential of Individual Countries, Treaty on Nonproliferation of Nuclear Weapons Problems of Extension",Russian Federation Foreign Intelligence Service, Appendix 2, 6 April 1995, http://www.fas.org/ nuke/guide/egypt/nuke/index.html;

[222] Shawn Pine, "Egypt's True Defense Expenditure 2.7 or 14 Billion Dollars?" Ariel Center for Policy Research, http://www.acpr.org.il/publications/arab_attitude/pp46-xs.html.

[223] Egyptian CBRN capabilities http://www.cns.miis.edu/research/wmdme/egypt.htm

assassination in 1981, President Anwar Sadat announced plans to build two nuclear power stations along the Mediterranean coast. These plans, though, were subsequently shelved.[224] FAS sources indicated there were reports that Egypt is planning a Chinese-made power reactor, variously assessed at between 300 MW and 600 MW, that could have the capacity to produce material for the production of as many as four nuclear warheads a month.[225]

Egypt is believed to be seeking joint nuclear weapons research with Syria and Saudi Arabia to share costs and allow Egypt to continue its conventional military buildup. Besides, in early 1992, a deal was made for Argentina to deliver one more reactor with a capacity of 22 megawatts to Egypt6. The contract signed in 1991 for the delivery to Egypt of a Russian MGD-20 cyclotron accelerator remains in force.[226] Since 1990, a number of Egyptian scientific projects are being carried out under the aegis of the IAEA. There are bilateral agreements in the area of the peaceful use of atomic energy with Germany, the United States, Russia, India, China, and Argentina. There are, moreover, agreements with Great Britain and India to provide assistance in training national cadres for scientific research and work on the country's atomic enterprises. Moreover, since 1974, Egypt has taken the initiative of proposing to render the Middle East nuclear-weapons free zone, calling all countries in the region without exception to join the NPT. In April 1990, Egypt took the initiative to render the Middle East free of weapons of mass destruction. The 1991 Madrid Peace Conference established a multinational mechanism to work on making the Middle East a nuclear weapon-free zone. This

[224] Anthony Cordesman, WMD in the Middle East, Center for Strategic and International Studies Online Edition, http://www.csis.org/mideast/reports/WMDinMETrends.pdf
[225] Shawn Pine," Egypt's True Defense Expenditure 2.7 or 14 Billion Dollars? " Ariel Center for Policy Research, http://www.acpr.org.il/publications/arab_attitude/pp46-xs.html.

mechanism, however, stalled three years ago as a result of the Israeli position. Egypt also hosted in April 1996 the conference for signing the declaration on rendering Africa a nuclear-weapons free zone. President Mubarak did say in October 1998, that Egypt could acquire nuclear weapons to match Israel's capability if this proves necessary, "If the time comes when we need nuclear weapons, we will not hesitate. I say 'if' we have to because this is the last thing we think about. We do not think of joining the nuclear club.[227]" This speech was evaluated as more of an effort to push Israel towards disarmament talks than any kind of threat.

2.5 Saudi Arabia's Weapons of Mass Destruction Capability

The proliferation of ballistic missiles, along with CBRN capabilities, is a major potential threat to international relations, and to the Middle East in particular. Although Saudi Arabia supports arms control treaties that limit biological, chemical, and nuclear weapons, it is unclear whether those alone suffice to defend against military threats exposed by Iran and Iraq. Saudi Arabia is vulnerable to foreign invasion as evidenced by the Iraqi invasion of Kuwait in August 1990. Iraqi forces threatened Saudi hinterland, and occupied the Saudi town of Khafji after a quick fight in January 1991.Only US-led ground campaign saved Saudi Arabia from a potential invasion.[228] Saudis count on US for positive security assurance. It is unlikely for Saudi Arabia that it will jeopardize its security relationship with US by means of a WMD procurement effort. However, alliances are always precarious in international relations given that security interests - rather than friendship- are the main impetus of policy. Therefore, if need be, it can risk its

[226] Cordesman, op. cit.
[227] Cordesman, op. cit.

relation with US in the name of another more vital national interest, namely national survival. Because Iran and Iraq are both seeking to improve their long-range missile, biological, chemical, and nuclear weapons capabilities, they pose a significant threat against Saudi Arabia. Furthermore, this threat becomes manifolded given that Saudi Arabia does not have any CBRN programs, and it falls short of conventional parity with Baghdad and Tehran.[229] Thus, it would be imprudent for Riyadh to assume that US would always come to its defense. Different sources indicate that it has no nuclear, biological or chemical weapons programs.[230] However, Saudi Arabia has a foundation for building a nuclear deterrent. It possesses CSS-2 (DF-3), long-range (2,400 to 3,100 kilometers) surface-to-surface missiles, acquired from China as a reaction to 'the war of the cities' during the Iran- Iraq War. CSS-2 ballistic missiles would serve as an ideal delivery system for Saudi nuclear weapons.[231]

The Saudis bought 50 to 60 missiles, 10-15 mobile launchers, and technical support from China at a cost of about $3 billion to 3.5 billion. American intelligence failed to detect the international transfer of intermediate-range ballistic missiles as well as the Saudi personnel who began traveling to China for training purposes.[232] Because CSS-2 missiles are largely political symbols and have only token warfighting capability, they are reported to have begun to seek a replacement for the present missiles.[233] This raises a serious concern due to several reasons. First, CSS-2 is a very costly weapon. It is being

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[228] Richard L. Russell, "A Saudi Nuclear Option?", Survival, Vol.43, No.2, Summer 2001, pp.69-70.
[229] Anthony Cordesman, Saudi Military Forces Enter the 21st Century: Proliferation and Saudi Missile Capabilities, p.1, www.csis.org/burke/saudi21/saudimilenters21-XIV-prolif.pdf
[230] Weapons of Mass Destruction in the Middle East-Saudi Arabia, www.ns.miis.edu/research/wmdme/saudi.htm; Cordesman op. cit. p.2; Concerns about proliferation: nuclear weapons and ballistic missiles, www.fas.org/asmp/profiles/saudi_arabia.htm#concerns; Russell, op. cit. pp.70-74.
[231] Russell, op. cit, p.72.
[232] Ibid.
[233] Cordesman, op. cit, p.10

produced in very small numbers with Chinese assistance. Second, it has a low lethality rate owing to its conventional payload and a high circular error probable (2 to 4 kilometers). In China same system is used for the delivery of nuclear weapons, but China configured it to have only conventional payload. Saudi Arabia and China assured US that its payload would remain conventional.[234] Third, it is argued that as now configured, the missile system may do more to provoke attack or escalation than to deter attack or provide retaliatory capability.[235] This point became clear to the Saudis during the Gulf War. King Fahd rejected advice to retaliate against Iraqi strikes because he felt that strikes that killed civilians would have a provocative, rather than a deterrent effect.[236] Finally and most importantly, Saudi acquisition of chemical or nuclear warheads would radically improve the value of the system as a deterrent or retaliatory weapon. Hence, they may work clandestinely to develop a nuclear capability as much the way they acquired CSS- 4, and as much the way Iraqis tried to develop an atomic bomb prior to the Gulf War. Richard Russell argues that insecurity and the regional proliferation of weapons of mass destruction may very well be pushing Riyadh towards procuring a nuclear deterrent.[237] This possibility makes Saudi Arabia a state of proliferation concern.

Under the circumstances, Saudi officials conducted suspicious contacts. Saudi Arabian Prince and other Saudi military officials have toured Pakistan's nuclear weapons facilities in 1999 after Pakistan's nuclear tests, but there is no evidence that they intend to buy an "Islamic bomb." The only disturbing aspect of talks with Pakistan is stated to be some estimates indicating Pakistan's production of fissile material will begin to exceed

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[234] Ibid.
[235] Scott Peterson, "Missiles Bring War Home", Christian Science Monitor, Vol.89, Issue 171, 1997, p.6.
[236] Ibid.
[237] Russell, op. cit, p.77

its domestic military requirements at some point around 2005. Besides, little data are available of what discussion Saudi Arabia had with China about the possible purchase of weapons of mass destruction. According to a Saudi defector, the Saudi inclination to buy security may have included attempts to acquire nuclear weapons. Mohammed Khilewi, first secretary at the Saudi mission to the United Nations until July 1994, said that the Saudis have sought a bomb since 1975. According to Khilewi, the Saudis sought to buy nuclear reactors from China, supported Pakistan's nuclear program, and contributed $5 billion to Iraq's nuclear weapons program between 1985 and 1990.[238] These actions would violate Saudi commitments under the Nuclear Nonproliferation Treaty, which Saudi Arabia signed in 1988 to ease concern over their purchase of long-range Chinese ballistic missiles.

The CSS-2 acts as a low-level deterrent and a symbol of Saudi Arabia's willingness to retaliate against Iraqi and Iranian strikes. The CSS-2 also symbolizes the risk that Saudi Arabia will buy much more capable missile and seek weapons of mass destruction. Saudi Arabia has Patriot 2 missiles as a missile defense system. The Patriot 2 missiles in Saudi inventory have only limited intercept capability against advanced Scud missiles. While a new defensive missile system is planned to be provided-the Patriot 3-, it is not clear when and if it can be effective against more advanced missiles with higher closure speeds. Iran is already testing such missiles, and it is perfectly plausible that Iraq will develop them if it can break out of sanctions. While nations like Iran, Iraq, Israel, Libya, and Syria are the major proliferators in the region, Saudi possession of the CSS-2 can also be interpreted as an incentive to be a part of the missile arms race in the Middle

[238] Concerns about proliferation: nuclear weapons and ballistic missiles, http://www.fas.org/asmp/profiles/saudi_arabia.htm#concerns

East, or acquire weapons of mass destruction. Despite Saudi acquisition of CSS-2 does not provide them with any real deterrent, it does make them a possible target during a conflict. It can well be thought that CSS-2 is only meaningful when they have nuclear, biological, or chemical warheads. Under these circumstances, Saudi Arabia may well opt for WMD.

2.6 Israel's Weapons of Mass Destruction Capability

2.6.1 Israel's Missile Capabilities

Israel's is the only army in Middle East that has the most advanced conventional and unconventional military capabilities. Experts indicate that as a part of its first long-range missile force, Israel deployed up to 50 Jericho I (YA-1) missiles with 500km range and 500kg payload.[239] These missiles are argued to be near copies of two-stage, solid-fueled, French MD-620 missile. What is more, it possesses approximately 50 Jericho-II missiles with 1,500km range, and 1,000kg payload, and reportedly nuclear warheads might be stored in close proximity to the missiles. Apparently, Jericho II had its first tests in 1986 over the Mediterranean that reached a range of 460 kilometres (288 miles). Another test across the Mediterranean reached a range of 820 kilometres (510 miles) landing south of Crete.[240] Israel also launched another Jericho missile across Mediterranean that landed about 250 miles north of Benghazi, Libya. Since its maximum range is 1,500 kilometres, it seemingly can cover the entire Arab World, and even the south of Russian Federation. Furthermore, it is stated that Israel began work on an

[239] Center for Nonproliferation Studies-Monterey Institute of International Studies http://cns.miis.edu/research/ wmdme/israel.htm

[240] Anthony Cordesman, Weapons of Mass Destruction in the Middle East, Center for Strategic and International Studies Online Edition, January 2001, pp.27-31; D.A. Fulghum and J.M. Lenorovitz, "Israeli Missile Base Hidden in Hill," Aviation Week & Space Technology, 8 November 1993, pp. 29-30.

updated version of the Jericho II in 1995 in an effort to stretch its range to 2,000km.[241] It is controversial how Israel deploys its missiles. They may be deployed on mobile launchers or in underground bunkers or through transport-erector-launchers (TELs). Jane's Intelligence Review published its satellite photos of what it said as a Jericho missile base. The journal's assertion was that a TEL was used in the base.[242] There are reports of the development of a long-range, nuclear-armed version of Popeye air-to-surface missile with global positioning system (GPS) guidance, and reports of possible cruise missile designs that can be both surface-ship and submarine based.[243] Still, another variant of the Popeye air-to-surface missile is believed to have a nuclear warhead. Israel bought 160 MGM-52 Lance missiles (with 130km range and 450kg payload) from the US in the 1970s. In addition, the Jewish State has 'Shavit' space launch vehicle (SLV) with 4,500km range and 150kg to 250kg. payload. There are unconfirmed reports of Jericho-3 program under development using Shavit technologies, with a range up to 4,800km and 1000kg payload. It is maintained that Israel currently reviews its military doctrine including its missile basing options, the hardening and dispersal systems. There are also sources indicating that Israel will solve its survivability problems by deploying nuclear-armed missiles on its new submarines. Foreign Report stated that Israel could develop a sea-based assured second-strike capability using three dolphin-class diesel electric submarines that Germany recently provided to Israel. The Federation of American Scientists (FAS) reports that Israel may have secretly carried out its first test launches of cruise missiles capable of carrying nuclear warheads from the German-built

[241] Israel's Nuclear Weapons- http://www.fas.org/nuke/guide/israel/nuke/index.html
[242] Harold Hough, "Could Israel's Nuclear Assets Survive a First Strike?" Jane's Intelligence Review, September 1997, pp. 407-410.

submarines in May 2000.[244] Some reports also indicate that Israeli submarines may be capable of carrying nuclear-armed Popeye Turbo cruise missiles to provide a second-strike capability. Popeye Turbo is an air-launched cruise missile that is estimated to be operational by 2002.[245] Foreign Report stated that Israel could develop a sea-based assured second-strike capability using three dolphin-class diesel electric submarines that Germany recently provided to Israel.[246] Indeed, an Israeli analyst asserted that Israel has already gained the second strike capability.[247] The Federation of American Scientists (FAS) reports that Israel may have secretly carried out its first test launches of cruise missiles capable of carrying nuclear warheads from the German-built dolphin class submarines in the Indian Ocean.[248]

2.6 Israel's Weapons of Mass Destruction Capability

2.6.2 Israel's Nuclear Weapons Capability

Israel, although widely recognised as possessing a sophisticated nuclear arsenal, has never openly tested nuclear weapons. There is no solid evidence that Israel has ever conducted a nuclear test, although some have suggested that a large seismic event that

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[243] Uzi Mahnaimi and Peter Conradi, "Fears Of New Arms Race As Israel Tests Cruise Missiles", London Sunday Times June 18, 2000.
[244] Center for Nonproliferation Studies (CNS) -Monterey Institute of International Studies http://cns.miis.edu/ research/wmdme/israel.htm
[245] Israel's Nuclear Posture Review-CNS Issue Brief on WMD in the Middle East, http://cns.miis.edu/ research/wmdme/israelnc.htm, pp.1-3.
[246] Douglas Davis, "Defense Officials Said Urging Nuclear Second-Strike Capability", Jerusalem Post, Aug 6, 1998, pp1-3.
[247] Interview with Reuven Pedatzur, May 2001,Bilkent Hotel, Bilkent, Ankara.

occurred in the southern Indian Ocean in 1979 was the result of a joint South African-Israeli nuclear test.[249] Until July 1998, not even any single Israeli official made declaration that the country has nuclear weapons. At a press conference in Jordan in 13 July 1998, former Israeli Prime Minister Shimon Peres publicly admitted, "Israel built a nuclear option not in order to have a Hiroshima but an Oslo."[250] After the nuclear weapons tests in South Asia[251] in May 1998, Israeli government is prompted in a reevaluation of the country's ambiguous or 'opaque' nuclear weapon status. Israel maintained a long-standing policy of ambiguity regarding its nuclear arsenal, frequently expressed in the statement that "Israel will not be the first to introduce nuclear weapons into the Middle East". Nevertheless, Israel refuses to allow international inspection (International Atomic Energy Agency -IAEA- inspection) of their main nuclear reactor, Dimona.[252] Israel has signed the CTBT, but is not a party to the NPT. As for its nuclear capacity, there are different figures. However, recent consensus is that it has the capacity to have produced 100-200 nuclear warheads.[253] The Federation of American Scientists

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[248] Yirmiyahu Yovel, "Blast, from the past to the present" Ha'aretz, 28 July 2000.

[249] Carey Sublette, "Report on the Vela Incident", http://www.fas.org/nuke/hew/Safrica/Vela.html

[250] Israel's Nuclear Posture Review-CNS Issue Brief on WMD in the Middle East, http://cns.miis.edu/research/wmdme/israelnc.htm, p.1; "Peres Admits to Israeli Nuclear Capability", IsraelWire, 14 July 1998; DoD News Briefing, Tuesday, July 14, 1998.

[251] India breached the international taboo on "going nuclear" in 1998, by testing a series of nuclear explosive devices on May 11 and 13 and officially declaring itself a new "nuclear-weapons power." India's May 11 and 13, 1998, nuclear tests and nuclear-weapons declaration produced a matching reaction from Pakistan, which, after briefly hesitating, tested a series of nuclear devices of its own on May 28 and 30 and also declared itself a nuclear-weapon power. Upon these developments Israel began to reevaluate its nuclear policy. Shai Feldman, director of the Jaffee Center for Strategic Studies (JCSS), Israeli defense analyst Ze'ev Schiff caution against a change in Israeli policy of nuclear ambiguity in their recent articles. Shai Feldman, "The Nuclear Test in South Asia: Implications for the Middle East," Strategic Assessment 1 (July 1998), http://www.tau.ac.il/~jcssjb/ v1n2p2.html; Ze'ev Schiff, "No Change in the Nuclear Policy," Ha'aretz, 11 September 1998, http://www.haaretz.co.il/eng.

[252] Avner, Cohen "Cairo, Dimona, and the June 1967 War", Middle East Journal, Vol, 50, No. 2, Spring 1996, pp.190-210.

[253] "Photos Reveal Israeli Nuclear Capacity", Middle East Intelligence Bulletin, Vol.2, No.8, 5 September 2000; Center for Nonproliferation Studies-Monterey Institute of International Studies http://cns.miis.edu/research/ wmdme/israel.htm; Douglas Davis, "Defense Officials Said Urging Nuclear

(FAS) have confirmed such capacity, and published new photographs of Israel's Dimona nuclear reactor in August 2000. Dimona is the most important Israeli nuclear reactor. The other is the 5-megawatt highly enriched uranium (HEU) light-water reactor at Nahal Soreq. Dimona is a 40-150 megawatt heavy water reactor, which is not under International Atomic Energy Agency (IAEA) safeguards. It was argued to be a natural uranium reactor used for the production of the fissile material. Yet, the satellite imagery published by FAS is interpreted as that Israel has probably not undertaken large-scale production of enriched uranium at Dimona.[254] Although previous reports have alleged that the Israelis began projects to enrich uranium using gas centrifuge and laser separation techniques in the 1980's, photos of the Space Imaging Corporation's IKONOS satellite provided important clues as to the amount of plutonium and enriched uranium the reactor can produce.[255] These, in turn, can be used to estimate the possible size of Israel's nuclear arsenal. There were reports that Israel has built additional facilities (cooling towers) near Dimona.[256] It is stated that a comparison of the IKONOS photos with declassified American satellite photos from the 1960s indicates that there have been no additional cooling towers built at Dimona since 1971. The FAS report concluded that "based on plausible upper and lower bounds of the operating practices at the reactor, Israel could have produced enough plutonium for at least 100 nuclear weapons, but probably not significantly more than 200 weapons". Previous estimates ranged as high as

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Second-Strike Capability", Jerusalem Post, Aug 6, 1998, pp1-3; Israel's Nuclear Weapons- http://www.fas.org/nuke/ guide/israel/nuke/index.html

[254] "Israel's nuclear reactor on the World Wide Web", IsraelWire, Thursday, August 17, 2000; "Photos Reveal Israeli Nuclear Capacity", Middle East Intelligence Bulletin, Vol.2, No.8, 5 September 2000.

[255] Gerald Steinberg "Accountability and Confidentiality in Israeli Military Procurement", Prepared for presentation at the Conference on Political Control of Bureaucracy in Democratic Systems, Research Committee on Structure and Organization of Government (SOG) of the International Political Science Association, February 16-18, 1997, http://faculty.biu.ac.il/~steing/public/account.htm

400.[257] This sophisticated nuclear weapons program, with an estimated 100-200 weapons, can be delivered by ballistic missiles or aircraft. Along with the ballistic missiles, Israel has a wide range of delivery means of WMD including cruise missiles and aircraft. Cruise missile force comprises of Delilah/STAR-1 UAV with 400km range and 50kg payload, Gabriel-4 anti-ship cruise missile with 200km range and 500kg payload, and Harpoon anti-ship cruise missile with 120km range and 220kg payload. Its aircraft inventory include fighter and ground-attack aircraft: 2 F-15I, 6 F-15D, 18 F-15C, 2 F-15B, 36 F-15A, 54 F-16D, 76 F-16C, 8 F-16B, 67 F-16A, 50 F-4E-2000, 25 F-4E, 20 Kfir C7, and 50 A-4N. Ground systems include artillery and rocket launchers.[258]

2.6 Israel's Weapons of Mass Destruction Capability

2.6.3 Israel's Chemical Weapons Capability

Israel signed the CWC on 1/13/93, and is currently debating its ratification. It has an active chemical weapons program, but is not believed to have deployed chemical warheads on ballistic missiles. Center for Nonproliferation Studies (CNS), FAS and other specialists claim that the Jewish State possesses production capability for mustard and nerve agents.[259] It is reportedly capable of gas warfare and defending against chemical weapons. According to some reports, Israel revitalized its chemical warfare facilities south of Dimona in the mid-1980s, after Syria deployed chemical weapons and Iraq

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[256] "Israel's nuclear reactor on the World Wide Web", IsraelWire, Thursday, August 17, 2000; "Photos Reveal Israeli Nuclear Capacity", Middle East Intelligence Bulletin, Vol.2, No.8, 5 September 2000, p.2.
[257] Elizabeth Stevens, "Israel's Nuclear Weapons - A Case Study", Nonproliferation Analysis ,Volume I, Issue 1, Summer 1995, pp.2-5.
[258] Anthony Cordesman, Weapons of Mass Destruction in the Middle East, Center for Strategic and International Studies Online Edition, January 2001, pp.27-31
[259] Center for Nonproliferation Studies-Monterey Institute of International Studies Middle East Program, http://www.cns.miis.edu/research/wmdme/israel.htm

began to use these weapons in the Iran-Iraq War.[260] Anthony Cordesman points to a cooperation between America and Israel in the chemical field. He states that a cargo plane in October 4 1992 crashed in southern Amsterdam killing 43 in the apartment complex it hit. The extensive examination after the crash revealed that the plane was carrying 50 gallons of dimethyl methlphosphonate, a chemical used to make sarin nerve gas. He further states that Israelis first denied this and then claimed it was only being imported to test gas masks.[261] Israel has extensive field exercises in chemical defense. Israeli army has stockpiled gas masks, and was the only one distributing them to its population during the Gulf War. Israel has also warhead delivery capability for bombs, rockets and missiles though it is not believed that it deployed chemical warheads.[262]

2.6 Israel's Weapons of Mass Destruction Capability

2.6.4 Israel's Biological Weapons Capability

Israel has not signed the BWC. It has conducted extensive research into weaponization of biological agents and defense against biowarfare. It is believed to be ready to quickly produce biological weapons, but that there is not any active production effort.[263] Israel is extensively reported to have a biological research facility, Israeli Institute for Biological Research at Ness Ziona, about 12 miles south of Tel Aviv. It is underlined that this facility created enough public concern in Israel so that the mayor of Ness Ziona wanted it to be moved away from populated areas. The facility is reported to

[260] Jonathan B. Tucker, "Evidence Iraq Used Chemical Weapons During the 1991 Persian Gulf War", The Nonproliferation Review, Spring-Summer 1997, Vol.4 Number 3, p.116
[261] Cordesman, op cit. p. 30
[262] Ibid.
[263] Center for Nonproliferation Studies-Monterey Institute of International Studies Middle East Program, http://www.cns.miis.edu/research/wmdme/israel.htm

have stockpiled anthrax.[264] An Israeli analyst privately confirmed that Israel has fully developed bombs and warheads capable of effectively disseminating dry storable biological agents in micropowder form. [265]

[264] Israel's Nuclear Weapons- http://www.fas.org/nuke/guide/israel/nuke/index.html; Center for Nonproliferation Studies-Monterey Institute of International Studies Middle East Program, http://www.cns.miis.edu/ research/wmdme/israel.htm.
[265] Interview with Reuven Pedatzur, May 2001,Bilkent Hotel, Bilkent, Ankara, Turkey.

CHAPTER III

SELECTED RHETORICAL STATEMENTS

3.1 Iraqi Statements

Ten years after Iraq's invasion of Kuwait Saddam Hussein's regime remains in power. It is still refusing to allow inspection teams to verify that Iraq is deprived of its WMD. Despite years of sanctions, ongoing military actions, routine bombardments to enforce no-fly zones, he refuses to surrender his remaining weapons of mass destruction. The unity that the international community formed to liberate Kuwait seems to have vanished with the only exception of UK and US remaining determined to contain Iraq. Owing to the oil for food program, Saddam has attempted to upgrade its air defenses since the 1990-1991 Gulf War. It is reported that Baghdad is trying to modify its ground forces equipment to augment its dwindling air-defense equipment.[266] In the mean time Saddam Hussein tries to reposition himself as the leader of the Arab World against the West and Israel. In March 2001, he addressed the Arab summit calling for war to liberate Palestine. He also called for Arab unity, while making a direct link between Islam and Arabism. Saddam appealed to the entire Arab nation to fight Israel and America. He is also reported to make a hostile reference to 'two foreign countries' (both ethnically non-Arab countries), which border the Arab nations, namely Turkey and Iran.[267] Moreover Saddam declared that he could raise an army to fight those Western and foreign forces. There are reports that ordinary Arabs believe that Saddam is prepared to do it. Jane's

[266] Andrew Koch and Michael Sirak, "Iraqi air defenses under strain", Jane's Defence Weekly, 28 February 2001, p.1-3.
[267] "Saddam calls for war", Jane's Intelligence Digest, 30 March 2001, p.1.

Security reports that there is increasing evidence his grass-roots support throughout the Arab world is growing.[268] He is continuously portraying himself as a staunch defender of the Arab rights and his calls for war may well be widely popular among the Arab community. Besides, head of the Palestinian Liberation Organization, Yaser Arafat called for Saddam's help in the fight against Israel again in March 2001.[269] On March 3 2001, former Iraqi foreign minister Tariq Aziz sent a letter to the Arab Union. It is indicated that because Turkey gives logistical support to air raids conducted towards Iraq, it holds full responsibility in these actions that harm the Iraqi people. He, further stated that Iraq has the right to self-defense, and asked Turkey to compensate for all the damage done by the air raids.[270]

3.2 Iranian Statements

As for Iran, there are more worrying declarations than Iraq's. Iran's Defense Minister publicly acknowledged the development of the Shahab-4. He first called it a more capable ballistic missile than the Shahab-3, but later categorized it as a space launch vehicle with no military applications.[271] Iran's Defense Minister Ali Shamkani also publicly announced plans to develop a Shahab-5 which is estimated to be a intercontinental ballistic missile or a space launch vehicle. On July 21 1998 Iran tested Shahab-3 claiming that it was a defensive action to deal with potential threats from its neighbors. General Mohammad Bagher Qalibaf, head of the Islamic revolutionary Guards Corps' air wing publicly reported on August 2 1998 that Shahab-3 was guided by an

[268] "Iraq sponsors bombers", Jane's Security Online Edition, 3 August 2001, www.janes.com/security/international_security/news/fr
[269] "Arafat Saddam'dan destek istedi", NTVMSNBC, 9 Mart 2001, www.ntvmsnbc.com/news/69133.asp
[270] "Irak Türkiye'yi şikayet etti", NTVMSNVC, 3 Mart 2001, www.ntvmsnbc.com/news/68386.asp

Iranian-made system that gives its accuracy.[272] He said, "The final test of every weapon is in a real war situation but, given its warhead and size the Shahab-3 is a very accurate weapon." President Mohammed Khatami on August 1 1998 stated that Iran was determined to continue to strengthen its armed forces, regardless of international concerns:[273] "Iran will not seek permission from anyone for strengthening its defense capability". Iran publicly displayed the Shahab-3 on its launcher during a parade on September 1998. The missile carrier bore signs saying "The US can do nothing" and "Israel would be wiped from the map". Israel's army chief, Lieutenant-General Shaul Mofaz told Israeli radio that the combined development of the missile and a non-conventional capacity posed a threat not only to Israel, but also to any country within range of the missile.[274] Iran tested a solid state missile it called the Shahab-D on September 20, 2000. The Iranian Deputy Defense Minister, Vice Admiral Ali Shamkani, claimed that it was part of a peaceful program for launching satellites. What is more alarming is that in October 1991, Iran's deputy President Ayatollah Mohajerani stated that Iran should work with other Islamic states to create an 'Islamic bomb'.[275] However, when President Rafsanjani was asked if Iran had a nuclear program in an interview in the CBS program 60 Minutes in February 1997, replied "Definitely not. I hate this weapon."[276] Other senior Iranian leaders including President Khatami have made similar denials. Iran's Foreign Minister Kamal Kharrazi stated on October 5, 1997 that "We are certainly not developing an atomic bomb, because we do not believe in nuclear weapons. We

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[271] Associated Press, July 15, 2000; Reuters, July, 2000.
[272] Anthony Cordesman, Weapons of Mass Destruction in the Middle East, September 2000, Online Edition, www.csis.org/stratassessment/reports/WMDinMETrends.pdf, p.54.
[273] Ibid.
[274] Cordesman, op. cit, p.57.
[275] Cordesman, op. cit, p.70.
[276] Ibid.

believe in and promote the idea of the Middle East as a region free of nuclear weapons and other weapons of mass destruction. But why are we interested to develop nuclear technology? We need to diversify our energy resources. In a matter of a few decades, our oil and gas reserves would be finished and therefore, we need access too other sources of energy. Furthermore, nuclear technology has many other utilities in medicine and agriculture. The case of the United States in terms of oil reserve is not different from Iran's. The United States also has large oil resources, but at the same time they have nuclear power plants. So there is nothing wrong with having access to nuclear technology if it is for peaceful purposes."[277] Besides, Iranian officials have repeatedly complained that the West tolerated Iraqi use of chemical weapons and its nuclear and biological build-up during the Iran-Iraq War, and has a dual standard where it does not demand inspections of Israel or that Israel sign the NPT. Again denying Iranian efforts to have nuclear weapons, the Iranian Ministry of Defense stated on January 18 2000 that " the Islamic Republic of Iran, which has taken the initiative to launch a dialogue of civilizations does not need to resort to nuclear weapons or violence."[278] In 17 May 2000, Turkish Prime Minister Bulent Ecevit has accused Iran of failing to respond to evidence of Iranian involvement in the murders of Turkish pro-secular writers and academics, referring to violence committed by Iran.[279] On July 31 2001, Iran reportedly test-fired an anti-armour missile capable of destroying the most sophisticated armoured equipment: ”The Saeqeh-1 enjoys a high infiltration capability and can destroy the most sophisticated

[277] Ibid.
[278] Cordesman, op. cit, p.76.
[279] “Turkey/Iran”, Voice of America Online 5/17/2000, p.1.

armoured equipment in the world", Iranian Defence Ministry announced.[280] Iran which is under a western arms embargo since the Islamic revolution of 1979 has reacted by designing and manufacturing its own sophisticated weaponry including missiles, submarines and helicopters and claims to be reaching self-sufficiency in defense. It is reported that the Azarakhsh fighter aircraft and the Tondar training jet aircraft, built by the Armed Forces of the Islamic Republic of Iran, will fly soon. Second Brig-Gen Olfati, the head of the Self-sufficiency Jihad of the Joint Staff of the Armed Forces, said: "The Armed Forces of the Islamic Republic of Iran is implementing 100 armoured, missile and naval vessel projects. Taking into account the 400 projects already implemented, it has taken a significant step towards self-sufficiency and foreign currency saving".[281]

Iranian Defence Minister Admiral Ali Shamkhani said on 21 August 2001that his ministry will push ahead with its plans to develop a "defensive" military force for the country to act as a "deterrent" to regional and international threats. He declared: "A further push for development and restructuring of the defensive capabilities of the country to the point where we can effectively establish a deterrent force and achieve defence preparedness against regional and international threats to the country's national security is among the fundamental plans of the defence ministry," he said at an open session of parliament while defending his current portfolio. He said the ministry was also seeking "to acquire arms with effective deterrent capabilities," upgrade the hardware in its aeronautics industries as well as produce military equipment with high range, precision and "destruction."[282] Iranian News Agency reports that Iran has succeeded in

[280] "Iran test-fires "anti-armour" missile, will "alarm US and Israel", BBC Monitoring Newsfile, 31/07/2001.
[281] "Iran manufactures military aircraft, other equipment", BBC, 5 February 2001.
[282] Defence Minister on post-revolution achievements", BBC, 6 February 2001.

producing its own version of a transport plane, a combat helicopter, a submarine and a guided-missile warship. In addition to test-firing an armour-piercing anti-tank missile the Sa'eqeh-1 (lightning) missile capable of destroying the most sophisticated armoured equipment, in May this year Iran also successfully test-fired a domestically made solid-fuelled missile. The surface-to-surface rocket can be guided to destroy targets with high accuracy. It is claimed that the Fateh (Victorious) 110 was totally planned and produced by Iranian experts at its army headquarters and that it greatly boosts the country's military superiority and self-sufficiency.[283] The country successfully test-fired last year a version of its Shahab-3 missile with a range of 1,300 kilometres (800 miles).

Political relations between the countries in the second half of the 1990s appear to seem warm. Although they are rivals with regard to the Caucasus and Central Asia, two sides do come to a table, and enter into an effective political dialogue nevertheless. Upon the invitation of the Iranian Foreign Minister Kamal Harrazi, Turkish Foreign Minister İsmail Cem paid an official visit to Iran on February 12,2001. During his two days visit, Cem met President Muhammed Khatami, Parliamentary head Mehdi Kerrubi and Kamal Harrazi. The contacts' focal point was the development of bilateral relations with regard to economy and regional security. Khatami stated that Cem's visit proved most beneficial in their relation to Turkey on political, economic and commercial grounds. Cem pointed out that Harrazi's last visit to Ankara reinforced the warm relations taking place for the last three years. He announced of a plan to establish Turkish-Iranian Commercial Council and that the organization of the Turkish side was about to be completed.[284] In their joint press meeting, ministers of both countries explained some of the details of cooperation on

[283] Ibid.

transportation and information technology. They declared that Istanbul-Tehran railroad would be operating soon. Ministers underscored the fact that they are very pleased because of the warm and constructive relations between countries, and that there is a cultural program signed by Turkey and Iran in order to improve relations further. What is more stated is that Iranian natural gas, when its transportation started, would ameliorate economic relations upgrading the commercial quotas up to nearly $2 billion dollars. The ministers also told they reached to a consensus that they would inform and activate their security establishment and units in line with their will to improve already enhancing security relationship.[285]

3.3 Egyptian Statements

Egyptian President Mubarak's aide said Egypt was prepared to deter any Israeli attack, Egyptian News Agency reported. Asked about the possibility of an attack to Egypt, he told that Egypt is well prepared to deter any attack.[286] In August 2001, news of a planned deal to sell North Korean No-Dong surface-to-surface missiles to Egypt became public. About the deal, a senior Israeli security source said, "The Americans will worry about this deal; we are more concerned by other missile transactions, between the Americans and Egypt."[287] Egypt has reportedly denied it has such plans to acquire the Korean missiles, while the US State Department has said it has received "satisfactory answers," from Cairo that make it believe that the missile program is "within acceptable

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[284] "Türk-Iran İş Konseyi Kuruluyor", NTVMSNBC Online, 13 Şubat 2001, www.ntvmsnbc.com/news/63714.asp

[285] "İran'la İlişkilerden memnunuz", NTVMSNBC Online, 12 Şubat 2001, www.ntvmsnbc.com/news/63335.asp

[286] "Mubarak's aide says Egypt prepared to 'deter' any Israeli attack", BBC Monitoring, February 01, 2001.

[287] "Egypt's US Weapons Put Regional Superpower on Guard", Reuters, 26 August 2001.

limits." According to the Haaretz report, the Israeli defense establishment recently expressed its concerns to the US about the approval given to sell Egypt Harpoon missiles, which can be launched from ships and jet fighters, standard missiles launched from ships, and especially a package of Patriot missiles. The Israeli Air Force views this as a significant upgrading of Egypt's anti-aircraft defense system.[288] According to the report, the US claims that the arms it supplies to Egypt are intended for defense or deterrence.[289] Going back to the recent past declarations, former Egyptian Minister of War, General Abdel Ranny Gamassay stated in 1975 that "if Israel should decide to use a nuclear weapon in the battlefield, we shall use the weapons of mass destruction that are at our disposal."[290] Some reports claim that Anwar al-Sadat said in 1970 that Egypt has biological weapons stored in refrigerators and could use them against Israel's crowded population. This report indicates that Egyptian biological capability includes work on plague, botulism toxin, encephalitis virus, anthrax, rift fever, and mycotoxicosis.[291] Furthermore, before his assassination in 1981 President Anwar Sadat announced plans to build two nuclear power stations along the Mediterranean cost.[292] President Hosni Mubarak said, in October 1998, that Egypt could acquire nuclear weapons to match Israel's capability if it becomes necessary: " If the time comes when we need nuclear weapons, we will not hesitate. I say ' if ' we have to because this is the last thing we think about. We do not think of joining the nuclear club."[293] President Hosni Mubarak, on September 29, 1998 said that peace should be supported with power: "Israel wants to

[288] Ibid.
[289] Ibid.
[290] Anthony Cordesman, Weapons of Mass Destruction in the Middle East, September 2000, Online Edition, www.csis.org/stratassessment/reports/WMDinMETrends.pdf, p.25
[291] Dany Shoham, "Evolution of Chemical and Biological Weapons in Egypt", Ariel Center for Policy Research, www.acpr.org.il/publucations/bmd/index.html#pp43.
[292] Cordesman, op. cit, p.25.

monopolise all types of nuclear weapons and missiles and wants to deny others the right to procure the same weapons," said Mubarak in an interview with the Egyptian daily Al Ahram.[294]

3.4 Syrian Statements

Syria is still a very tightly controlled dictatorship, and the decision making process was entirely in the hands of former President Assad and he seldom spoke, and not all on WMD. However, in August 29 1997, the Syrian Minister of Defense Mustafa Tlass warned Israel against launching a surprise attack. He said that Israel would pay dearly for any attack on Syria. He also added that Israeli policies had created a very bad situation in the area and the policies closed the door on any hope for peace in the Middle East.[295] Furthermore, Defense Minister Tlass wrote an article on how to conduct a biological warfare published in an Iranian newspaper. The article, which can be seen in the appendix, includes information on range, effectiveness and methods of exploitation of bioagents in detail.

Turkey and Syria have been at loggerheads for years over the issues of water and terrorism. After the October 1998 crisis between the countries[296], an agreement was signed in Adana (although it is generally referred to as an "agreement", the document actually is entitled "minutes", suggesting that it is something short of a full-fledged agreement), and relations started to get warm. Continuing mutual military visits took

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[293] Cordesman, op. cit., p.26.

[294] "Mubarak: Israeli claims on Egypt's growing military power, unacceptable", Egyptian State Information Service, September 29 1998.

[295] "Syria Warns against Surprise attack", Jane's Sentinel, August 30, 1997.

place in 2001, and the two countries also held a meeting on the resumption of regular train services.[297] Countries signed a protocol to improve relations in the fields of economic and commercial relations, scientific, technical, educational, and cultural relations in June 2001.[298] Ankara is also cooperating with Damascus on a pipeline to carry 175 billion cubic feet of gas a year from Egypt through Jordan and Syria to Turkey.[299] As of August 2 2001, the two sides were working on a friendship cooperation document.[300]

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[296] Alan Makovsky, "Defusing the Turkish-Syrian Crisis: Whose Triumph?", Middle East Insight, January-February 1999,www.washingtoninstitute.org /media/makovsky.htm.
[297] "Iraq-Turkey-Syria Train Services to be Resumed", Reuters Business Briefing, May 6, 2001.
[298] "Turkey and Syria Sign Protocol to increase relations in a number of fields", Reuters Business Briefing, June 21, 2001; "Relations Between Border Towns of Turkey and Syria Accelerate", Reuters, May 20, 2001; "Turkish, Syrian Ministers' talks of Consolidated ties of brotherhood", Reuters, 23 August 2001.
[299] "Turkey-Syria Relations Warm", Reuters, 22 June 2001.
[300] "Syria, Turkey Ready to Sign Cooperation Document", Reuters, 2 August 2001.

CONCLUSION

In the post-Cold War period, there is still no authority to be relied on to help the weak. Therefore, international system is still anarchic. A change occurred in the international system when the bipolar structure of the world disappeared, but the system itself did not change. Throughout history, states sought devices that they hoped would change the status quo. Proliferation of weapons of mass destruction provided them with very effective war devices to achieve so.

With the end of the Cold War balance of power, some states have increasingly sought to redefine their power status regarding their neighbors. This revisionist urge caused a rapid increase in mass destruction weapons proliferation. Incentives of the states of proliferation importance are a robust combination of political, military and economic origin. The value of WMD as a political tool originates in their use to achieve coercion. By changing the potential costs associated with defending vital national security interests of any state under WMD threat exposure, proliferators may alter calculation of interests; deter military intervention or the use of threat of force. This compels any adversary to redefine its regional role. Hence, WMD has the capacity to change the regional balance of power.

Each type of WMD has its own effects, but generally the military utility of chemical, biological, nuclear and radiological weapons is twofold: First changing the conduct of war and risk assessments through the threat of use. This deterrence effect can prevent any state from threatening or beginning armed hostilities, reducing its power (the

ability to change or manipulate other states' actions). Secondly, WMD raises the cost of any future conflict owing to the latent catastrophic damage that can be made against military units or civilian populations. It may well threaten the survival of a country by means of destroying the linchpin of the political body, namely the capital. What's more, states view the development and possession of WMD as providing economic benefits. States may seek to produce and sell these capabilities for capital or barter for other weapons. Indigenous production is likely to enable states such as Iran to take advantage of the WMD trade.

Turkey's neighbors (Iran, Iraq, Syria, Egypt, Saudi Arabia and Israel) conduct extensive unconventional weapons procurement programs. Even if Turkey does not know whether they have the intention to actually use them, these procurement efforts and emerging WMD arsenals pose a credible threat towards Turkey. Because above mentioned military, political and economic benefits can be gained through mere acquisition.

The culture of military strategy cannot and should not ignore the " what if " question. What if one day Iran, Iraq or even Israel decides to intimidate Turkey via their unconventional capabilities? What will Turkey do in a crisis escalation with a country possessing WMD? Most probably, there will not be a hot conflict, but it is most likely that the state, which lacks the countermeasures, will be deterred. Military analysts always bear in mind the concept of "worst-case analysis", or to borrow from the Cold War terminology "window of vulnerability."

The impetus of the procurement endeavors of the Middle Eastern states is manifestly high. The emerging arsenals of the states, which are detailed in the body text,

give reason to argue that Turkey confronts WMD threats coming from the Middle East. This threat, because it depends upon acquisition, increases gradually and becomes more perilous.

Developments after the Iran-Iraq War, and particularly the Gulf War caused Turkey to include WMD and ballistic missiles in the hands of its neighbors in its threat assessment.[302] In early 1999, a NATO assessment reinforced this evaluation that Turkey faces ballistic missile threats from Iran, Iraq and Syria. Noting that Turkey's three largest cities-İstanbul, Ankara, and İzmir- are now within the range of its neighbors' ballistic missiles, the document recommended developing military and civilian response structures against these threats. And that is why Turkey is eager to acquire theatre missile defenses. Iranian Shahab-3 medium-range ballistic missile (MRBM) is capable of striking Turkey with a 700 kg. warhead. Iran is also continuing its development of the 1,000 kg. payload Shahab-4 missile that may be able to hit most parts of Europe, not to mention all of Turkey. Although Iran faces technical difficulties, one cannot expect them to last forever.

Syria, to the south of Turkey, deploys Scud-Bs and –Cs and SS-N-3b Sepal cruise missiles. It is working to load nerve agents onto Scud warheads and has chemical gravity bombs for delivery by its MiG-29 and Su-30 aircraft. During a 1998 crisis with Turkey, Syria redeployed 36 Scud-C short-range ballistic missiles (SRBMs) from its border with Israel to a position opposite the Turkish border. Unlike Iraq, Syria, and Iran, Saudi Arabia and Israel does not constitute an imminent threat against Turkey. Turkish-Israeli rapprochement is strong, and a threat is much less likely from Israel when compared to other states studied. Still, because Turkey is within range of long-range ballistic missiles

[302] Interview with the generals of the Turkish Air Forces who wished to remain anonymous.

of Israel and Saudi Arabia, examination of their capabilities must be included in this study.

Although Iraq's al-Hussein, al-Abbas and Scuds are destroyed by UNSCOM inspectors, it still retains the necessary technological capability. What's more, it is difficult to neglect the Iraqi attempts to resume its biological and chemical weapons development and delivery programs during the past two years. In 1999, Russian-made S300 (SA-10 Grumble in NATO designation) SAMs are intended to be delivered to southern Cyprus. The Greek Cypriot's aim was to end Turkish air superiority over the island. Furthermore, S-300's 150-kilogram conventional high-explosive fragmentation warhead with proximity fusing multiplied the threat posed. In 1997, Turkish military assessed that the S-300 could be modified to carry a nuclear, chemical or biological payload.[303] It could be used in a surface-to-surface mission also, hitting the important Turkish Mediterranean port cities of Antalya and Mersin. After diplomatic negotiations and under a Turkish threat to destroy the missiles if they were deployed on Cyprus, the S-300s were diverted to another Greek island, Crete.

Russian Federation has confirmed that it concluded the installation of S-300s in Armenia. Iran and Syria are reported to be very likely customers[304]. Consequently, Turkey confronts no little military threats, which must be addressed as soon as possible. The longer time passes, the bigger the threat becomes.

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[303] Interview with the generals of the Turkish Air Forces who wished to remain anonymous.

[304] Yossef Bodansky, "Syria embarks on a massive purchase of weapons", Conference for Middle East Peace Online Database, http://www.cmep.com/bod2.htm; Radio Free Europe Online, http://www.rferl.org / nca /features/1999/02/F.RU.990218174346.html ; Armed Forces Journal International, June 2001; Steve Rodan, "Gulf States alarmed by Russia-Iran alliance", Middle East Newsline, Wednesday March 21, 2001; http://www.worldtribune.com/wta/Archive-2001/eu-russia-03-21.html; "Syria Receives New Arms Shipments from Russia, North Korea", Middle East Intelligence Bulletin, Vol.2 No.5, June 1 2000.

APPENDIX A

A CLOSER LOOK AT THE CW

Chemical Weapons means the following together or separately: a) Toxic chemicals and their precursors b) Munitions and devices c) Any equipment specifically designed for use directly with munitions and devices.[1] 'Munitions and devices' are specifically designed to cause fatal harm or other harm through the toxic properties of toxic chemicals that would be spread as a consequence of the use of such munitions and devices. Toxic chemical means any chemical, which through its chemical action on life processes can cause death, temporary incapacitation or permanent harm to humans or animals. Precursor means any chemical reactant, which takes part at any stage in the production. Production of a chemical means its formation through chemical reaction.

Major chemical agents are of eight: the first type is nerve agents that quickly disrupt the nervous system by binding to enzymes critical to nerve functions causing convulsions and paralysis. They must be ingested, inhaled, or absorbed through the skin. A reaction upon contact normally occurs in 1-2 minutes, but death may occur from lethal doses within minutes. Recovery is normally quick if it occurs at all, but permanent brain damage can occur. Main nerve agents are Tabun (GA), Sarin (GB), Soman (GD), DF, VR-55 (Improved Soman), VK/VX.[2]

Although Tabun is the first nerve agent, discovered in 1936, Sarin is more infamous, and used by Aum Shinrikyo, a Japanese cult that carried out chemical weapons attack with it on the Tokyo Subway in March 1995. Sarin is almost as volatile as water

[1] Text of the Chemical Weapons Convention, http://projects.sipri.se/cbw/docs/cw-cwc-texts.html
[2] Anthony Cordesman and Ahmet S. Hashim, Iraq-Sanctions and Beyond, Colorado: Westview Press, 1997, pp. 295-305; Anthony Cordesman, Iraq and the War of Sanctions, Westport: Praeger, 1999, pp.444-

and delivered by air, and a respiratory dose of 100 mg/min/m3 is lethal and lethality lasts 1-2 days. VK/VX is another notorious agent, which is persistent and almost as heavy as fuel oil, and its lethality lasts 1-16 weeks.

The second type of agents is blister agents. They can be colorless or black oily droplets and absorbed through inhalation or skin contact. Blister agents penetrate ordinary clothing. They are cell poisons that destroy skin and tissue, which may cause blindness if contact occurs with the eyes. It causes serious internal damage if inhaled, and can result in fatal respiratory damage. It takes hours to days, but its effect on the eyes are much more rapid. Mustard gas is a typical blister agent and exposure to concentrations of a few milligrams per meter over several hours generally at least causes blisters and swollen eyes. If it touches the skin or eyes, it can cause second or third degree burns.[3]

It can blind and cause damage to the lungs leading to pneumonia. If exposed severely, it may cause intoxication similar to radiation sickness. If one is short of prevention of exposure, the only treatment is to wash the eyes, decontaminate the skin, and treat the resulting damage like burns. Blister agents are sulfur mustard, (H or HD), distilled mustard (DM), nitrogen mustard (HN), Lewisite (L), Phosgene Oxime (CX), and mustard lewisite (HL). Mustard gas was used extensively during World War I, "the king of battle gases" was then used on both sides in 1917, killed 91,000 and injured 1.2 million people.[4]

Third type is choking agents, agents that cause the blood vessels in the lungs to hemorrhage until the victim chokes or drowns in his or her own fluids. Symptoms emerge

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448; Anthony Cordesman, Iran-Dilemmas of Dual Containment, Boulder: Westview Press, 1997, pp.382-390.

[3] Ibid.

[4] Gert G. Harigel, op cit. p.2

in seconds up to three hours. They can be absorbed through inhalation; Phosgene (CG), Diphosgene (DP), PS Chloropicrin, Chlorine Gas.

Blood agents kill through inhalation. Little warning is possible for them except for headache, nausea, and vertigo. Because these agents interfere with use of oxygen at the cellular level, rapid exposure may kill by inhibiting cell respiration. What is crucial is that passive defense measures such as gas masks are not protective enough against blood agents, namely, hydrogen cyanide (AC) and Cyanogen Chloride (CK).

Fifth category includes toxins. These are biological poisons causing neuromuscular paralysis after exposure of hours or days. They are formed in cultures of the bacterium clostridium botulimun. Botulin toxin (A) has six distinct types of which four are fatal to human beings. All new generation of chemical weapons are referred to as developmental weapons of which only publicized one is perfluoroisobutene (PFIB), which is an extremely toxic odorless and invisible substance produced when PFIB (Teflon) is subjected to extreme heat under special conditions. For this kind of new weapons, no technical literature is available, and no protective equipment offers defense.

Control agents are agents that produce temporary irritation or disabling effects when inhaled or in contact with the eyes. Chlororacetophenone (CN) and O-Chlorobenzyl-malononitrile (CS) cause flow of tears, nausea and vomiting. Adamsite (DM) and staphylococcus cause irritation, coughing, severe headache, and tightness in chest, nausea and vomiting.

The last agent category is the ones that incapacitate people through causing short-term illnesses, psychoactive effects (delirium and hallucinations). They can be absorbed by means of inhalation or skin contact. The psychoactive gases and drugs produce

unpredictable effects, particularly in the sick, small children, elderly and individuals who already are mentally ill. They seldom kill; however, they may cause a permanent psychotic condition. The lethal dose is 100 to 200 milligrams. They are BZ-, LSD-, LSD-based BZ, Mescaline, Psilocyloin Benzilates.

Whereas protection with various degrees of efficiency is possible against chemical and biological weapons (CBW), it is not the case for defense against nuclear weapons. However, inconvenient it may be for military forces on the battlefield for maneuvering and attacking, still there are passive defenses such as gas masks, protective clothing and vaccination. CBW is different from nuclear weapons in terms of their delivery or transportation that is discussed in detail above. Furthermore, only BW can be comparable to nuclear weapons in the lethality rate only when special conditions needed for biological agents' survival and dispersal are met. Only nuclear weapons are completely indiscriminate by their explosive power, heat, blast radiation, and radioactivity.

HISTORY OF CHEMICAL WARFARE

The Greeks first used sulfur mixtures with pitch resin to produce suffocating fumes in 431 B.C during the Trojan War. Attempts to control them date back to ancient Greece again, and Romans. Around 500 B.C the Manu Law of War in India banned their use. By 500 A.D. Saracens prohibited them through their regulations on the conduct of war drawn from the Koran. In 1675, a Franco-German accord was signed in Strasburg. Then, in 1874, the Brussels Convention was signed in order to prohibit the use of poison or poisoned weapons. As for more recent era, the Regulation on Land Warfare included

articles outlawing poison.[5] This regulation was annexed to the Hague Conventions of 1899 and 1907.

Nevertheless, all belligerents in WWI used chemical weapons extensively. Prohibitions were largely ignored. The year 1922 saw the establishment of the Washington Treaty as a sign of the recognition of the inhuman aspect and suffering involved in chemical weapons use in the Great War. The signatories were the United States, Japan, France, Italy and Britain. And finally, World War I also paved the way for the adoption of the 1925 Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous and other Gases and of Bacteriological Methods of Warfare, also known as the 1925 Geneva Protocol. It is now nearly universal as a ban on the use of CW. Still, the Geneva Protocol did neither proscribe the stockpiling or the research on chemical weapons.

In spite of the conventions and treaties proscribing CW, Italians used them during the war of 1935 – 1936 in Ethiopia. Japanese used them in China during World War II between 1938 and 1942, and in Yemen from 1966 to 1967. Various chemicals agents were researched and developed so as to be weaponized against the enemy perceived.[6]

The Ottoman Empire at its late times, and the European colonial powers allegedly introduced CW to the Middle East. British forces reported in as early as 1916 on Turkish deployment of German-supplied CW in Baghdad.

British forces used them widely against Shias, a revolt in 1920. They employed gas in Palestine during the Battle of Gaza and in Baghdad. Spanish forces also used it in

[5] Peter Herby op cit pp.9-13; Panofsky op cit. p.7; Trevor Findlay, Chemical Weapons and Missile Proliferation, London: Lynne Rienner, 1991, pp. 24-31

Morocco during 1923 to 1927, Italians in Libya in 1930 and Ethiopia in 1935-40. Britons transported large stockpiles to the Middle East during World War II, and abandoned British stocks are cited as the source of CW used by Egypt in the Yemen civil war.

In the second half of the 20th century, interest in CW in the region accelerated owing to the Arab-Israeli wars. The period following the wars of 1967 and 1973 provided the region with a robust stimulus for developing CW. What's more, with the awareness of Israel's absolute weapon capability, early 1970s entailed retaliatory forces against a possible nuclear weapon use by Israel. Allegations of Egyptian CW use in Yemen depend upon sources of Western journalists, royalist sources opposing the Egyptian interventions, and the International Committee of the Red Cross (ICRC).[7] Alleged use focuses on three periods 1963, 1965 and 1967. Egypt always denied resort to CW in the Yemen War. International reaction to reports of alleged Egyptian CW use was weak, and the US response was muted, because of its own use of weaponized chemical agents. The US used herbicides and harassing agents in Vietnam. It used lachrymatory agents and heavy doses of defoliants. Vietnam experienced also napalm that is considered by some international organizations to be a chemical weapon.

Napalm is a substance to mask CW. Chemical weapons may be masked as defoliants. Between 1962 and 1971, more than 72 million liter herbicides were dispersed over South Vietnam of which more than 44 million liters were the defoliant agent orange containing 170 kg. dioxin. American scientists managed thickening gasoline into sticky syrup that burns more slowly but at a higher temperature than gasoline. This mixture is used in a high explosive charge to be scattered in the form of a flaming liquid, which

[6] Ibid.
[7] Chemical, Biological, Radiological and Nuclear (CBRN) Terrorism, http://www.fas.org/irp/threat

sticks to what it hits until burned out. This mixture is knows as Napalm, and can be used in aircraft or missile-delivered warheads against military or civilian targets. Although it is largely not regarded as a CW, it should be considered so since it was used largely and widely in Vietnam.

The Yemeni experience and the US use in Vietnam were the main stimulus for heightened interest in CW capabilities. Syria urged for Egyptian support in developing its own CW program right after the conflict in Yemen ceased. In the late 1960s, Iraq began its own CW program demonstrating a keen interest in the Egyptian case, and around this time Israel is said to have begun working on its offensive program.[8]

THE DIFFERENCE BETWEEN A CHEMICAL, BIOLOGICAL OR RADIOLOGICAL EVENT

Chemical, biological, and radiological materials as well as industrial agents can be dispersed in the air we breathe, the water we drink, or on surfaces we physically contact. Dispersion methods may be as simple as placing a container in a heavily used area, opening a container, using conventional spray devices that are used in agriculture, or as elaborate as detonating an explosive device through aircraft or missiles. Chemical events are characterized by the rapid onset of medical symptoms (minutes to hours) and easily observed signatures such as dead foliage, pungent odor, and dead insect or animals. In the case of a biological event, the symptoms require days to weeks and there will not be any characteristic signatures. Because of the delayed onset of symptoms due to different incubation periods lasting for different agents and possible use of infectious

agents, the area affected may be greater when infected individuals migrate. In the case of a radiological incident, the onset of symptoms requires days to weeks, as is the case for biological weapons. There will be no signatures indicating a radiological attack. Radiological materials are not recognizable by the senses, and are colorless and odorless. RW may present high level of radioactivity creating an immediate or long-term health hazard in a wide area due to traveling contaminated individuals. [9]

Public appreciation of the term 'biological weapons' is non-existent or little at best. When there is some comprehension of chemical agents due to their use in the First World War, unforgettable images of incapacitated troops in that war, alongside with the use by Iraq against Iran and against its own Kurdish citizens in the mid-1980s, there is no such general appreciation of biological weapons or warfare. They are envisioned as uncontrolled epidemics harming both aggressor and attacked. This is by no means the case. If protection measures (immunization of the body by vaccination or usage of respirators) are taken, then the agent will only affect the target population, not the attacker. Another point is that there are non-transmissible agents which are suitable for point-or region-strike, Not only selection of transmissible or non-transmissible agents is available, but by selection of the biological agent used, the outcome (incapacitation or death) can be manipulated as well. What are biological weapons, how do they differ from chemical weapons? The answer lies in their mechanism or mode of action.[10]

The scientific division between chemical and biological weapons is that chemical

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[8] Peter Herby, op cit. p.22; Jonathan B. Tucker and Kathleen M. Vogel, "Preventing the Proliferation of Chemical and Biological Weapon Materials and Know-How "Special Report, The Non-proliferation Review, Spring 2000, pp. 90-95

[9] Chemical/Biological/Radiological Incident Handbook, October 1998, www.fas.org/irp/threat

[10] Graham S. Pearson, "Their Nature and Arms Control", in Efraim Karsh (ed.), Non-Conventional Weapons Proliferation in the Middle East, New York: Oxford University Press 1993, pp. 102-103

weapons are non-living substances (left-hand four boxes), which poison the target population, while biological weapons are living micro-organisms (right-hand two boxes), which infect the target community. The killing mechanism of a biological weapon is disease. Human beings have yet to experience the full destructive power of these detestable weapons, for there have been only a few instances of biological weapons attacks, with the most rudimentary types of it.[11] The target of biowarfare may be humans, animals or plants whereas CWs applicability to plants is controversial. As to the route of primary attack of the target by BW, it is of four: In halation, ingestion of contaminated food and water, contamination of an open wound with bacterial warfare agent, and insect vectors. Inhalation is the main way of attack of human beings; other three are rather inefficient methods of warfare. As for the transmissibility, most of the traditional biowarfare agents are non-transmissible, hence will not cause an epidemic. However, if a transmissible agent is opted, then the disease can be transmitted from those exposed to the attack to those not exposed.[12]

HISTORICAL PERSPECTIVES ON BIOLOGICAL WEAPONS

Historically, BC 190 saw Hannibal winning a naval victory by firing vessels full of venomous snakes into the ships of the enemy. Thus, biological warfare is far older than the scientific understanding of germs and diseases. The Greeks, Persians and Romans poisoned wells with animal corpses. In 1346, an outbreak of plague in central Asia reached the Tartars besieging the port of Caffa (now Feodosia) in Crimea. The Tartars abandoned the siege, but they catapulted the bodies of their dead over the walls.

[11] Ibid, p.101
[12] Douglas Holdstock, "Biotechnology and Biological Warfare", Peace Review, 12:4 2000, pp.549-553.

Some Genoese traders fled home, taking the disease with them. In the next few years the Black Death spread throughout Western Europe. This episode stressed that biowarfare agents are indiscriminate, and do not always distinguish friend from foe. But as medical knowledge grew, it was concluded that when an infectious disease is endemic in a society, some degree of natural immunity develops, whereas the same disease can produce disastrous epidemics in non-immune populations. This insight was used by British troops in 1763, with the deliberate spread of smallpox to American Indians in Fort Pitt, Ohio by giving them infected blankets.[13] Napoleon in his Italian Campaign attempted to infect the inhabitants of Manchua, which he besieged with swamp fever. In World War I, Germans and France used germ warfare against animals, against cattle (in the German case as part of their economic blockade of Europe) and horses (cavalry were still a vital part of the military forces during the era) rather than humans. The germs used were anthrax (mainly a disease of cattle) and glanders (of horses), and the German program extended to the use of these agents in Argentina and the eastern United States to block prospective exports to UK and France. Because it is much more stable (existing as a yellow powder) and therefore more easily transported than most germs which have to be transported in liquid form, anthrax was used frequently, and is still the top-priority concern for many of the defense analysts.

The 1925 Geneva Protocol proscribed the use of bacteriological agents in warfare, but not research into their potentialities, and many countries continued research

[13] Ibid, pp.549-551, and Peter Hadfield, "Lethal Legacy" in New Scientist, Vol. 169, Issue 2276, 02/03/2001, p.5

programs. In particular, the activity of Unit 731 in Japan is a significant mention of biowarfare.

Japan was among the countries continuing research on BW, and the result was a odious episode. Japan made horrific experiments between 1932 and 1945 and researchers tested the effects of various candidate biowarfare agents, a wide range of bacteria.[14] These resulted in thousands of deaths mainly in Manchuria.[15] The victims included criminals and Chinese prisoners of war. The tests were extended to field trials, and attempts at weaponisation perhaps with actual use. There are also allegations of use of bacteriological warfare by Japan against China in the 1930s.[16] Survivor experimental subjects were usually murdered afterwards. After 1945, some of the perpetrators of these atrocities were punished as war criminals in the Soviet Union. Others were given immunity from prosecution by the USA in return for details of their studies.[17] This is a remarkable reminder of the lengths some desire to obtain information of possible military utility. In contrast to that, very little work was done during World War II in Germany due to the abhorrence of Hitler himself for the subject. This was not understood in U.K., where there was an active extensive program. The results of it were shared with the US and Canada after 1942.

Another landmark was the use of Gruinard Island in 1942-3 to carry out trials to determine whether an anti-personnel anthrax bomb would succeed, whether anthrax spores could be disseminated from bombs and such spores borne downwind would infect a flock of sheep. The experiments shaved that this could be done and the Scottish Island

[14] Ibid, p.6
[15] Holdstock, op cit.p.549.
[16] Pearson, op cit. p. 104.
[17] Holdstock, op cit. p.550

of Gruinard remained uninhabitable and a prohibited place for almost 50 years. It returned to its owners only in 1990.[18]

Claims have been made that U.S. used agents such as yellow fever, and its vector mosquito, anthrax, other animal diseases, brucellosis (undulant fever, normally affecting cattle, sheep and pigs), psittacosis (parrot fever) and tularemia (a highly infectious agent of rodents) during the Korean War. This program was eventually ended in 1975.

Biological studies in the Soviet Union after World War II was stimulated by realization of the possible military potentialities of BW shown by the Japanese activities, and it did not end despite entry into force of the Biological and Toxin Weapons Convention (BTWC). The next milestone in the story of biological warfare comes with the outbreak of anthrax in the Soviet city of Sverdlovsk (now Ekaterinburg). The Soviet program was based on Sverdlovsk and elsewhere, the agents studied included anthrax, plague, and several viruses among them smallpox and a variety of encephalitis. In 1992, President Yeltsin ended the offensive program and ordered that it should be converted to civilian use. He admitted that the anthrax outbreak in 1979 at Sverdlovsk, a scribed in the past to contaminated meat, in fact originated in the BW facility. Although only a few milligrams of spores escaped, nearly 70 people died. The facility may have been the first in the world to apply biotechnology to a biological weapons program.[19]

The other country to continue an extensive program, despite being a party to BTWC, is Iraq. The extent of their program came to light when UN inspectors started their task of implementing a settlement after the second Gulf War. They found a variety

[18] Steven Block, "The Growing Threat of Biological Weapons", American Scientist, Vol. 89, Issue 1, Jan-Feb 2001, p.7

[19] John J. Fialka, "Report Finds Some Weapons Lab Are Working Under Lax Controls", Wall Street Journal, Eastern Edition, Vol.237, Issue 28, 02/08/2001.

of agents, some in weapons-usable form (weaponized), for example in Scud missiles. These included botulism toxin, the fungus product aflatoxin that causes liver cancer, and anthrax and gas gangrene germs.[20]

Some of the materials and the original strains of the organisms were supplied from the U.K. and U.S. at the time of the Iran-Iraq war when Iran was at loggerheads with the States. Now, lack of evidence as to whether they still have some BW and other types of WMD is the stated reason for maintaining economic sanctions against Iraq, modified as of June 2001 and nuanced as 'smart sanctions'.

ARMS CONTROL PERSPECTIVES

The abhorrence against CW led to Geneva Protocol of 1925 that prohibited the use of CW and was extended to include a ban on the use of bacteriological/biological weapons. The Protocol following the First World War bans the use in war of asphyxiating, poisonous, or other gases and of bacteriological methods of warfare. It makes no provision for inspection or verification of allegations of use. Despite the fact that bacteriological weapons were included in the 1925 Geneva Protocol, a more comprehensive treaty to prohibit the development, production and stockpiling of BW and toxin weapons and their destruction was signed in London, Moscow, and Washington on 10 April 1972, referred to as BTWC.[21] Although above prohibitions of developing, producing, stockpiling, or otherwise acquiring or retaining such agents are made, there is

[20] Anthony H. Cordesman, WMD in Iraq, Center of Strategic and International Studies (Online Database), www.csis.org February 2001, pp.19; Kenneth M. Pollack, "Current Iraqi Military Capabilities: An Assessment", by the courtesy of Washington Institute in Middle East Review of International Affairs, Issue 4/ February 1998, p.3; Al J. Venter, "Iraq's Biological Weapons" in Middle East policy, Vol. VI, No.4, June 1999, pp. 107-113.

no prohibition of possession of a production capability. Thus when possession of BW would be a breach of the BTWC, the possession of dual-purpose weapons, equipment or means of delivery would not. This is the hardship confronting arms control endeavors. Another crucially important point is that there are no provisions for intrusive inspections and monitoring of compliance.

A point of confusion occurs when BTWC is examined, it addresses to biological agents and toxins, but neither of them is defined in the treaty. Still, it is obvious that the term biological agents apply only to the microbial organisms that are living and are able to replicate themselves. The toxins, although the natural products of microbial organisms or plants, are non-living and are strictly chemicals. Another term not defined in the BTWC is 'agents of biological origin'. It can cover ant material that can be produced by biological systems, and comprises non-living chemicals and living micro-organisms.

One of the characteristics of biowarfare is its subtlety. Many of the related allegations are unsubstantiated or unproven. Its use does not always produce a clear sign. This is especially the case if the selected agent causes a disease that is endemic in the country whose population is being attacked. This is why it is enigmatic to figure out whether endemics are results of natural outbreaks or intended use of bacteria.

BIOLOGICAL WARFARE AGENTS AND DELIVERY MEANS

The main classes of biological warfare agents are:

[21] Thomas Dashiell, " A Review of US Biological Warfare Policies", and Brad Roberts, "New Challengers and New Policy Priorities for the 1990s" in Brad Roberts (ed.), Biological Weapons-Weapons of the Future, Washington, D.C.: www.csis.org, 1993, pp.68-93 and 1-7.

Bacteria: These are causative micro-organisms that produce diseases such as anthrax, plague, and tularemia. They can be readily grown in artificial media using facilities akin to those in the brewery industry.

Viruses: These are the smallest forms of life and must be grown in living tissue, like Venezuelan equine encephalitis.

Rickettsia: It is the intermediate between viruses and bacteria, which also must be grown in living tissue, like the organism producing Q-Fever.

Fungi: A sample is coccidioidomycosis; few species appear to have biowarfare potential as the growth of fungus aspergilus causing aflatoxin.

Toxins: These are the non-living products of microorganisms such as botulinium toxin or staphylococcal enterotoxin B, of plants such as ricin from castor beans or of living creatures such as saxitoxin from shellfish.[22]

Biological-warfare agents vary considerably both in the quantity needed to produce disease or to intoxicate people, and in the nature of the effect-to incapacitate or kill. Biowarfare agents have delayed onset of symbols, twelve hours or more for toxins, and a few days or more for microbial agents. This delay is the basic difference between biological and chemical warfare; the latter is faster acting with nerve agents and hydrogen cyanide producing effects in minutes. Nevertheless, some chemical warfare agents such as mustard and phosgene take several hours to produce symptoms:

The choice of a biological agent involves consideration of a large number of factors such as the infective dose, the time to effect, and whether the agent produces a transmissible disease, as well as the method of attack of the target community (inhalation, ingestion or an insect vector), the means of dispersion or delivery of the agent, the stability of the agent, and the practicality of achieving an infective dose at the target personnel.[23]

As for the delivery means, the first is infecting animals and through them the disease can be spread. Secondly, producing aerosols of the particle size suitable to enter the human respiratory system and lungs. Third, missile warheads are used as a transporting vehicle, through fractionating the payload. The advantages of biological warfare include potency (small quantities are necessary); lack of sign, if an endemic disease agent is chosen; the ease of covert production using dual-purpose facilities; lack of risk to one's own forces; if a non-transmissible agent is selected; and finally large-scale or strategic, small-scale/tactical use, or covert/terrorist use. Disadvantages of them are the fragility/weaknesses of microorganisms in the atmosphere limiting their effectiveness; limited or no effectiveness if prevailing weather conditions are unfavorable; the difficulties and perils of keeping and handling BW agents and the uncertainty of effectiveness, as there is no proven prior use of them in war.[24]

A momentous development changing all those biowarfare processes and nature of the agents took place with the modern biotechnology. The first application of modern biotechnology to biowarfare was the Sverdlovsk program. According to one of the

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[22] Graham S. Pearson, op cit. p. 110
[23] Richard Falkenrath, "Weapons of Mass Reaction", Harvard International Review, Summer 2000, p.54 and Al J. Venter, "Iraq's Biological Weapons", Middle East Policy, Vol. VI. No.4, June 1999, p.109.
[24] Ibid.

defectors of the program, the plague organism *Yersinia* pestis, infections with which are curable when due treatment is applied, was genetically engineered to make it resistant to standard antibiotics. If it were used as a bacteriological weapon, its lethality would increase in gross, making the standard antibiotic treatment ineffective. Even if laboratory testings found an alternative antibiotic, the lethality of plague would be so high that very many people would die before treatment could be started.[25]

Currently biological weapons (BW) are feared more as terror weapons against civilians rather than battlefield weapons, but if troops were not immune this balance would change.[26] Several other techniques in biotechnology now or within a few years' time could make biowarfare more of a threat. Harmless bacteria, such as soil organisms, become causes of new diseases if bioengineered with genes from pathogenic germs. Apart from the above near-future possibilities, familiar disease-causing germs could be genetically modified to make them difficult to identify. Their stability in the atmosphere or in the environment could be enhanced, making organisms currently not usable as weapons more usable, Bacteriological weapons has also a unique feature making it even more of a characteristic tool to be weaponized; They can be used to attack plants, crops which could cause famine if the country concerned is dependent on a particular crop.[27]

A longer-term sinister possibility is the weapons targeted against specific ethnic groups, namely genetic weapons. Since the first draft of the human genome has been announced, it is being argued that as the details are filled in, and the identity of genes are found, the small but determining differences between ethnic groups will emerge. With

[25] Wendy Barnaby, The Plague Makers: The Secret World of Biological Warfare, London: Vision, 1999, pp. 62-67.
[26] Douglas Holdstock, op cit. p. 551

this information at hand, it will be clearer whether it is possible to design biological warfare agents.

-Toxins, viruses or bacteria-more harmful to one ethnic group. This is not an immediate threat, but still it renders a 'what if' question.[28]

In its June 2000 report, Overcoming Antimicrobial Resistance, the World Health Organization warned that the level of resistance to antibiotics of common germs is about to reach crisis point. AIDS, malaria, tuberculosis and prieumonia will become very hard and mote dangerous to treat. Understanding antibiotic resistance and developing new antibiotics as well as treatment of some diseases like cancer or an inherited disorder as cystic fibrosis depend upon biotechnology. Gene theraphy that is used during treatments could be misused to disguise viruses. At present only a handful of developed Western countries have the facilities to apply biotechnology to biological war, but many other countries will follow them in the next 15 years or so.[29]

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[27] Leonard A. Cole, The Eleventh Plague: The Politics of Biological and Chemical. New York: Freeman, 1997, pp.105-110.
[28] The Royal Society, Measures for Controlling the Threat from Biological Weapons, London: Royal Society, 2000, p.72.
[29] Major Gary Brown, "America's Struggle with Chemical and Biological Warfare (Book Review)", in Air Power History, Vol. 48, Issue 1, Spring 2001, p.2.

APPENDIX B

Syria's Interest in Biological Weapons: Article written by Syrian Defense Minister Gen. Mustafa Tlas, "Biological Warfare, A New and Effective Method in Modern Warfare"

FBIS Translated Text: IAP20000501000119 Tehran SAFF in Persian 04/25/2000 pp 38-42 [Article translated by First Lieutenant Mohammad Motahhari, Published in SAFF Issue No.235 [22 Nov-21 Dec 99].], [FBIS Translated Text]

1. The Concept of Biological (Germ) Warfare.

Biological warfare means intentional military action and use of toxic material against living creatures to annihilate the enemy and to inflict damage to subsistence or agricultural resources, in order ultimately to weaken the enemy's fighting power. A number of experts have called this kind of warfare Bacteriological, Germ and Biological, but here we have borrowed the concept of biological warfare from the biology term and will use it as such. Biological warfare is the first and the most primitive war that Mother Nature has staged against human beings; at the end of this century, the fight between them still continues in the most severe way. Though man has been able to control and overcome diseases such as plague, smallpox, cholera, typhus, and dysentery, still many diseases and toxins destroy millions of people every year weather in war or peace. If we note that Nazi Germany under the leadership of Hitler—who didn't care about international organizations and regulations—didn't use such weapons in critical and difficult moments in World War II and didn't resort to such wars, it was merely because first, he was frightened that the opposing forces might have reacted similarly; second, he

wasn't sure whether he would be able to cope with the consequences and control it. Generally speaking, in the history of war, resorting to biological warfare required that the violating party not be frightened of a similar reaction from the opposite party, and that biological and disease agents not be used against him in return. This was the case when a biological weapon was used in Japan's war against China before World War II, and also when the Americans used the same weapon in the Korean War. In continuing this iscussion we will see how the United Nations banned this weapon and why most countries accepted the sanction.

2. Biological Weapon.

A biological weapon consists of all elements and biological components along with the necessary tools to use them, knowing that these materials are merely the kind that harm and hurt human beings, animals, and plants. From the military point of view, biological weapons are divided into different groups: A. Germs [or microbes]. These are very tiny creatures that have neither smell nor color and could be kept alive in the outside environment. These germs play their role as follows:

- Bacteria: These are microscopic creatures that have a vegetation and botanical origin; This is the basic material that causes diseases such as cholera and typhoid for human beings, a kind of plague for animals and birds, and a kind of Siberian smallpox harmful to human beings and animals.
- Viruses: These are creatures that are a hundred thousand times smaller than bacteria and cause typhoid fever, yellow smallpox, and so forth.

• Rickettsia [the Persian/Arabic term used is riketziyat]: They are intermediate segments and related to the two previous kinds. Their prevalence causes diseases such as smallpox and so forth and could be carried by many agents among them insects.

• Fungi [the Persian/Arabic term used is fotriyat]: These creatures are of a botanical origin and have more complicated structure than bacteria. They are found individually and in a group. These creatures can cause diseases such as Histoplavis [as published, possibly referring to Histoplasmosis].

B. Toxins [or poisons]. Toxins consist of those materials that have a high degree of poison and can disseminate germs, which, after they are dried up, can be kept for several weeks. Poisons cause various diseases. To develop poisons, it is necessary to observe a certain period of time, not less than two hours.

C. Potassium Toxins [as published]. Potassium poison is one of the strongest poisons; the percentage of its active toxin is at least tens of thousands of times (Footnote 1: 432 grams of this material is enough to destroy the entire population of the world). Potassium poison is capable of inflicting serious damage to the central nervous system as well as optical and circulatory systems; it can even destroy these systems and cause death.

D.Ontagious Carrier Creatures. Among these creatures, insects such as ticks, blood-sucking insects, and lice could be named. E. Harmful Insects and Plants. Many harmful insects and some plants are available that could be used against the enemy in order to inflict harm on enemy forces. Yet there are means and tools that can be employed for biological warfare, and among them we refer to the following:

• Bombs: For instance, an American-made bomb called the “M-114” is capable of carrying 320 cubic centimeters of a biological liquid. Another kind, the “M-32”, is capable ofcarrying 108 times more than the “M-114,” almost about 35 kg.

• Mortar and tank ordnance is among other tools to carry such materials.

• Airplane bomber systems (bomb launchers) frequently contain some liquid material and or a large quantity of harmful insects.

• Sounds, boxes and containers that are thrown out of airplanes [as published].

• Direct contamination of water and food resources by penetration and mercenaries.

3. Methods of Exploitation, Range, and Effectiveness.

Biological agents and materials are used in two ways:

• Wind-borne dissemination of these materials toward the desired target in order to contaminate a vast area. This method is among the most effective ways and is used widely.

• Direct dissemination of these materials over the desired target by airplane. This method on one hand has more precision but inevitably more materials must be used to contaminate avast area.

Other methods include contaminating water and food resources. This is a serious danger, because first, it is done clandestinely and individuals are not aware of it; second, using this method will result in many more casualties. Of course this can be done when the enemy has no sanitation control over water and food resources. Obviously in this case the existence of chemical and biological agents will be revealed easily by the enemy. Likewise, insects are also scattered in war zones. These insects are harmful to human beings, animals, and plants, and will cause various respiratory and in particular skin

diseases. Of course, the existence of these insects in war zones is usually discovered immediately, because it is not normal to see insects in high numbers in war zones. As for when biological weapons should be used, it must be said that at night or early in the morning is better. At this time of the day, wind speed reaches 2 to 4 meters per second, the temperature does not exceed 10 degrees Centigrade, and there is no rain either. The range and infliction of biological bombs in comparison with chemical and nuclear weapons are different and could be cited as follows:

- The range of infliction of bombs by bombers (airplanes) carrying toxic chemical material is about 60 sq. km and this area is covering the region in which the biological materials are disseminated.
- This area for the airplane itself which is carrying an atomic bomb weighing up to 100 kilo ton [as published], is up to 100 to 1000 sq. km.
- Yet, the infliction range of the biological material reaches up to 2000 sq. km.

In reference to how long the effects will continue, it must be said that the effects are not less than two days. It must be noted at the same time that lice, which sometimes can be used to harm the enemy, can survive for a year.

4. Prevention Against Biological Agents.

What we mean by prevention is to prevent the exposure of individuals to these agents and materials. But if an individual comes down with an illness, inevitably he must seek medical treatment as with ordinary illnesses. For this reason, individuals use various tools and equipment to avoid such exposure, such as use of a mask.

To prevent contact with harmful insects and animals and so forth group-oriented equipment such as shelters and dormitories equipped with special air-filtration and

ventilation may be used. In addition, vaccination is widely used nowadays, in which one vaccine can prevent disease and provide immunity for up to 10 to 15 people. Also, group vaccinations, which are disseminated in the air, could be used. These kinds of vaccines provide coverage to more individuals and decrease the percentage of those infected with disease. Therefore, inevitably there must be severe control in health and medical systems, whether it is in reference to safeguarding the water resources or to place the food items in secured places, for example by placing them in secured and tight containers. If individuals become contaminated, they should take measures to clean the contamination and change their clothing. Luckily, most items used for cleaning off toxic materials can be used for biological contamination as well. The list of contamination cleaning materials includes chlorine compounds, oxidation materials, phenol, furmalin [as published] and so forth. Discovering the existence of biological materials and contamination resulting from these materials is accomplished with the use of special tools able to recognize tiny particles in the air—of course, they are not able to establish the nature of these materials. Yet, to run a laboratory test we must have a sample of the biological agents.

5. Usage and Application of a Biological Weapon in War

A biological weapon is used on specific targets on enemy soil or it is used to remove some tactical problems in the battlefield. In both cases (use in the battlefield and or on enemy soil), weather a nuclear weapon is used or not, it is necessary to learn from the experiences. Also when using this weapon we must be aware of the consequences and potential problems it may cause. To use these kinds of weapons many issues must be considered. If the price and value of the launching and firing tool and also the price of the bomb itself which is fired toward a specific target is more than the predicted damage

inflicted on the enemy by using this weapon, it is not wise to take such action. (Otherwise it is “wise? “- Yael)

Former commander of the US armed forces Gen. Estabis [as transliterated] believes that current biological equipment could resolve many strategic problems and could target all facilities and installations of an area of one continent!! Therefore, it is necessary to use biological agents that are able to live a long time in order to provide the opportunity to form contaminated clouds over the desired region. If we assume that the biological and disease-bearing material remains for a complete day and night and for the early morning hours, or approximately for 15 hours; and also that wind speed is about 40 km per hour, in that case the toxic cloud formed will cover more than 600 km. Yet for assurance it is necessary that the bombing continue until all of the clouds and toxic dust created by it covers the entire desired area. Also, the distance between each contaminated cloud should not be more than 600 km. Whenever a nuclear weapon is used by a country that possesses this kind Of weapon against another country that [also] possesses nuclear weapons, inevitably the fire of nuclear war will be inflamed and will be followed by a reaction and similar confrontation by the violated country and or its allies. Such a country has at a minimum entered into a nuclear by-way from which withdrawal will be very difficult. But if, on the other hand, a biological weapon were used instead of a nuclear weapon, there would not be any of the above consequences. In this case (use of a biological weapon), not only will the violated country not be able to discover the effects of infliction immediately, but also, international public opinion will not believe the claim of the violated country regarding the use of this weapon. Such a country also will have a hard time attracting the attention of world public opinion and international organizations.

Also, it is rarely seen that the violated country takes action against the aggressor by using a nuclear weapon. But the most dangerous thing that can happen is the lack of control of the biological weapon after its use. It is possible that the following day the wind direction will change and bring back all of the material to the aggressor country. Another point of view believes that if a country possesses biological weapons, it will never use them until it has the equipment and the tools to neutralize and control the consequences. The issue of "Greenyard" island, which is located northwest of Scotland, still is remembered. During World War II, when British scientists were conducting their tests and created the anthrax virus, it was realized that this germ would contaminate this island up until 1966, and it is still believed that the contamination will continue for another 100 years. It is basically possible to employ carrier vectors for diseases, but the possibility of contaminating individuals is rare; therefore, they are not among the most leading tools of biological warfare. There is a fear that if a disease is transferred to insects and other animals, the balance in nature may change and may have grave and irreparable consequences. Considering all these issues, it is necessary to pay attention in using such biological materials, namely: considering land conditions, climatic conditions, the lifetime of biological disease-bearing agents, and the effect of contaminated clouds on agricultural and fertile lands. In addition, the following appear necessary for study:

- Reinforcement and consolidation of existing forces in the targeted region and knowing whether or not there are any living creatures and also their nature. One must note whether there are only military individuals in the region, or civilians as well;
- The distance between the target and the forces, facilities, and installations of friendly countries, allies, and neutral countries;

- The duration of effects of the biological weapon;
- The essence of the objective pursued and its importance—to determine whether it is necessary to occupy the targeted area, or retreat from it, or just pass it by.

If military and civilian individuals live in the targeted region, a kind of biological weapon that has limited destructive impact must be used. But if there are only military individuals in that region, a biological weapon that has a strong destructive power must be used. An equipped army that takes part in contemporary war must have an area 300 km deep at its disposal and accommodate itself in it, and it must not forget that at any given time the enemy's forces and groups may attack it. To recognize and identify the location and the situation of these groups, which will be scattered in a vast area, will be difficult. Justifying the use of biological weapons over a very far-reaching area or in wind blowing in the direction of fertile agricultural lands also is very difficult, because such action may cause a very severe reaction from the other side and or destruction of the enemy's fighting power in a way that will not realize even the direction of the infliction. In reference to biological agents and disease-bearers, one must note the "Rabbit" germ, which destroys human beings and living creatures. Humans have no immunity [to it] and it can be transferred to the enemy in a very short time. (Nb: recent isolated outbreaks of the Rabbit germ -Yael) This kind of weapon acts in such a way that until it reaches the area of dissemination, the enemy is not aware of its existence. Usually, tactical or operational missiles (with a range of several hundred kilometers) fire them. Likewise, potassium poisons are used when the objective is to have an immediate impact on the enemy. In a targeted region where civilians live, normally a non-lethal biological weapon is used, such as mountain smallpox virus in which the casualties are fewer and non-

contagious. Sometimes a type of biological weapon is used which is very difficult to treat and cure those who have been exposed to it. There are 32 different types of agents and biological weapons that are used in warfare. Another 160 exist but are inactive and have not been used yet. Yet there are many types that are more active and are considered military secrets and have not been disclosed by the countries that have discovered them.

The objective of every war is to destroy the enemy's military forces and to damage the economic system of that country in a way that paralyzes its fighting forces' support system. Biological weapons are used to destroy agricultural targets and particularly the enemy's food resources. Destruction of the enemy's agricultural resources and livestock weakens the industries and production of milk, cheese, dairy products, hide, wool, medical first aid, cotton, tobacco, and tea, and other resources will decrease. It must be mentioned that the grains (wheat and rice, which are among the most important food items) make up 75 percent of the world's food items. Therefore, biological agents as a tool and weapon capable of being reproduced and distributed over a vast area of agricultural lands and which will cause many people to become ill are used. Another kind of biological material called Fungi [fotriyat] immediately upon attacking the target, spontaneously split and break up and are disseminated over a vast area. These materials, among the disease-bearing and biological agents, play a considerable role in destroying plants and agricultural fields, and destroy wheat, rice, and potatoes. These agents, which are normally in a dense and compressed form (footnote 2: These are biological and disease-bearing agents that form a very hard layer around themselves and can live and reproduce even in very unsuitable conditions), are conveyed over long distances by wind, and contaminate a vast area; for a short time they will remain in the primary region just to

be transferred to other places, then be relocated again and again to other places. Rain, natural waters, insects, animals, as well as human beings could be the transfer vectors.

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